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ABSTRACT

This guide provides a variety of tools that can help educators, building staff, or school districts decide how to include environmental education in their curriculum. Chapter 1 identifies important environmental education concepts. Chapter 2 describes different general approaches and the advantages of each. Two models and the key components of some of the latest research in environmental education are presented in chapter 3. Information on the Iowa Concept Chart and the Pennsylvania Grade Level Concepts, which show how programs meet the standards, are discussed in chapter 4. Appendices include lists of: the Iowa Department of Education mission and goals; Governor conference priorities; Iowa resource agencies and organizations; Iowa commodity groups; National resource agencies and organizations; and an environmental education glossary of terms. (Contains 34 references.) (CCM)

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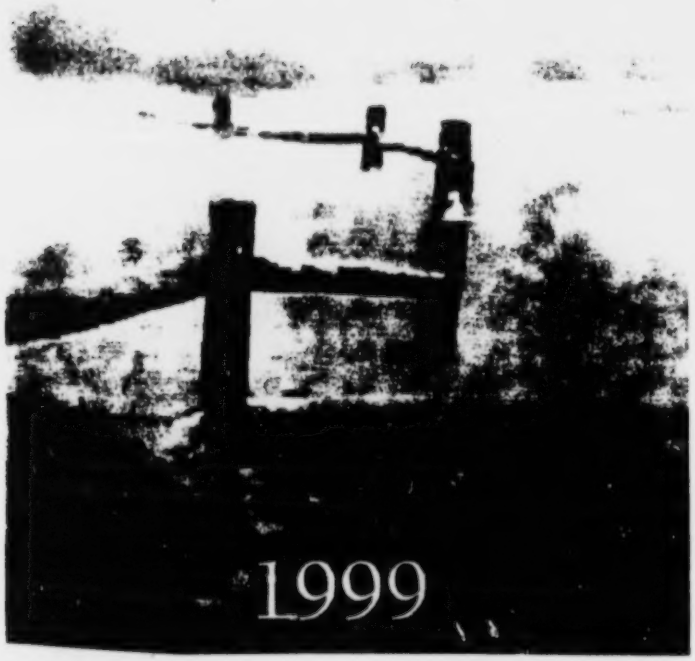

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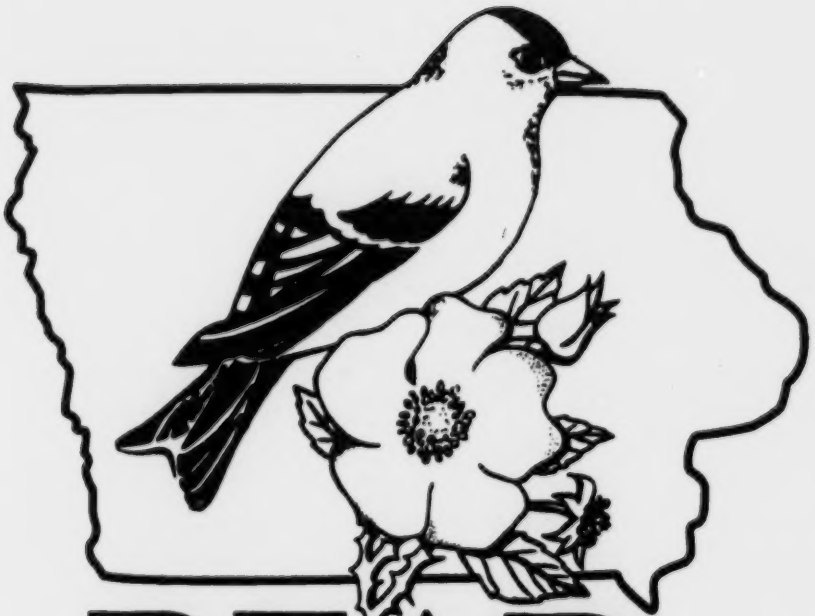

REAP

Resource Enhancement and Protection
Conservation Education Program

Models and Approaches for Environmental Education in Iowa

Iowa Department of Education

1999

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State Board of Education

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Dedication

This document is dedicated to the many educators who have devoted their lives to the educational process, thereby making Iowa a place to grow and live. Aldo Leopold, Iowa native and the father of Conservation Education, set the standard early on in his book called *A Sand County Almanac*. Many outstanding educators followed and devoted time and effort to the development of environmental education in Iowa and to this publication.

A special tribute to Linda Scheuermann, Roland-Story Elementary School for the devotion, time and effort displayed by her to assist in the development of this publication. Linda spent hours researching, tabulation and cross-checking the information presented.

Thank you to all those who have given so much to sustain the environmental education process in Iowa.

Preface

The conservation of natural resources and environmental awareness shall be taught in science grades 1-12.

State Code of Iowa

Overview

This guide provides a variety of tools that can help an educator, building staff or school district decide how to include environmental education in their curriculum.

Chapter 1 — Standards and indicators identify important concepts in environmental education. Several indicators are listed for each of the three main standards of knowledge, appreciation and action. Also discussed are the components needed to **change learner behaviors** in a positive way. Educators can decide which standards, indicators and assessment tools are appropriate for their area.

Chapter 2 — Different general **approaches** are described, as well as the advantages of each. The **Experiential Approach** emphasizes "hands-on" learning, often outdoors (but not always) in a natural setting. The **Residential Approach** refers to using an overnight facility for environmental education experiences. Three examples of **Integrated Approaches** are explained, including: Thematic, Interdisciplinary and Transdisciplinary, as well as some possible steps for planning this approach.

Chapter 3 — Two models are described which include key components of some of the latest research in environmental education. The **Issue Investigation Model** uses an environmental issue as the focus for taking students through four levels: issue analysis, ecological foundations, issue investigation, and responsible action. The **Environment as the Integrating Concept for Learning (EIC)** is based on a national study of 40 schools. It found students learn better with an environmentally-based context than within a traditional educational framework. This section describes the project, the results and main concepts.

Chapter 4 — With the variety of environmental education options available, two ways of **fitting into the big picture** are shown. One is the **Iowa Concept Chart** that shows how three programs (national environmental education programs used in Iowa) fit with main concepts under Iowa's goals of knowledge, appreciation and action. The other is the **Pennsylvania Grade Level Concepts** which gives an example of benchmarks one state is using to evaluate environmental education concepts at grades 4, 7, 10 and 12.

Appendices — Other resources in the appendices include the Iowa Department of Education mission and goal, priorities from the Governor's Conference on Environmental Education, environmental education materials, a variety of agencies and organizations that may be able to help, and some term definitions.

Educators will want to review the following to choose the parts that meet their students' needs. A teacher may choose to implement environmental education alone; a school or a school district may decide to develop a more comprehensive approach.

- standards and indicators
- one or more approaches or models
- other resources found in Chapter 4 and the Appendices
- the environments and human resources of their community

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Planning for Environmental Education

Introduction

This book is a guide for district staff to integrate environmental education into the existing curriculum. They may use a single subject or an interdisciplinary or transdisciplinary approach. Multiple models and approaches are provided to help educators design a meaningful curriculum.

School improvement initiatives often call for integration and collaboration of education staff and members of the community. This guide describes some models and approaches for doing that and for accomplishing the goal described by Iowa House File 2272:

> *The goal for the early childhood through twelfth grade educational system in Iowa is to improve the learning, achievement, and performance of all students so they become successful members of a community and workforce.*

Success will require collaborating, experimenting and dedication by building staff and community members.

This guide can help educators enable learners to:

- be active citizens concerned about their community, region and world,
- be knowledgeable about their surroundings and
- make wise decisions to resolve and/or prevent environmental problems.

Quality of life depends on many factors, including a healthy and sustainable environment. Environmental education helps people consider the deeper intricacies of how various practices affect the natural world of which we are a part, and how we can work to achieve a better world.

Iowa has had a concerted, ongoing environmental education program for many decades. The focus of these efforts has been on improving teachers' environmental education knowledge, appreciation and process skills. The Governor's Environmental Education Conference, held in 1990, established priorities for the 1990's in environmental education for all Iowans, and these will continue into the twenty-first century.

Through a grant from the Resource Enhancement and Protection Conservation Education Program (REAP CEP), a variety of projects were developed to address some of the established priorities, including this guide.

The Iowa Department of Education mission statement champions excellence in education. Although there are many pathways to educational excellence, all require dedication, leadership, and perseverance. Environmental educators also need these characteristics as they empower learners to see themselves as integral parts of the natural and human-built world.

The object of education is to prepare the young to educate themselves throughout their lives.

—Robert Maynard Hutchins

Chapter 1

The one real object of education is to have a [person] in the condition of continually asking questions.

—Bishop Mondell Creighton

Standards and Indicators

The following standards and indicators identify important concepts in environmental education. They serve as a starting point for an educator, building staff or district that is deciding what to include in their curriculum. These standards and indicators are not all-inclusive and staff may choose to add or delete items from this list.

The Advisory Committee involved with preparing this guide carefully considered a number of possible standards. They chose to focus on three: **knowledge, appreciation, action**, and a limited number of indicators for each.

Standards

Knowledge: The learner will develop knowledge of the environment and its interactions, including human impact on the environment.

Appreciation: The learner will develop sensitivity, personal appreciation and a sense of environmental stewardship.

Action: The learner will implement environmentally responsible actions after analyzing issues and developing problem-solving skills.

For more help in understanding some of the **knowledge** concepts, refer to the environmental terms in the appendix. The indicators for appreciation and action are different in methodology and understanding; therefore, learner choices, rather than concepts, are stressed.

Environmental **appreciation** transcends environmental knowledge by:

- developing a sense of respect, awe and love for her/his surroundings; and
- providing an opportunity to sense the aesthetic qualities of her/his natural environment.

Educators reach the **action** level when teaching environmental education by:

- promoting responsible citizenship through cooperative learning activity that benefits the community;
- implementing learner activity initiated through knowledge, understanding and appreciation;
- engaging in a participatory democracy;
- encouraging the concept of doing more with less; and
- innovating with constructivist, whole language, cooperative learning, and problem-solving activities that benefit the local, regional or global community.

The key to resolving environmental issues is **empowerment** through cooperation by:

- effectively using all disciplines;
- recognizing the value of local agencies, organizations and individuals as powerful resources to assist with the environmental education process; and
- enabling the attitude that each learner can make a difference.

Indicators

Standard—Knowledge: The learner will develop knowledge of the environment and its interactions, including human impact on the environment.

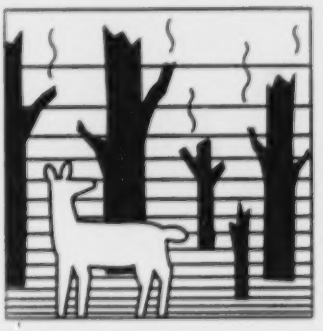
Indicators—The learner will:

1. Distinguish between individuals and populations in terms of their needs and characteristics.

   Individual living things have certain basic needs. Populations are made of many diverse individuals within the gene pool and are characterized by such things as growth rates, and birth and death rates.

2. Understand how adaptation and natural selection permit life forms to adjust to their environmental conditions.

   Populations may adapt to a changing environment. Examples of adaptations include specialized parts, growth rates, shapes, colors; or behaviors for eating, moving, reproducing, finding protection, or other survival needs. Each species occupies a unique niche. Populations that do not adapt to a changing environment may become extinct. Humankind's unique ability to adapt has resulted in unprecedented population increases, often to the detriment of other species.



3. Analyze the interrelationships of an ecosystem, including humans.

   An ecosystem includes all of the living and nonliving components of an area which interact with each other. It includes many relationships, including examples of competition, cooperation, neutrality, and predator-prey. Each component has a direct or indirect connection to everything else.

4. Predict how changes in limiting factors, such as light, water, air, soil, temperature, and space will affect an area's carrying capacity.

   Habitat includes adequate food, shelter, water, space and arrangement. Each species has habitat needs that may be distinct from other species or may compete with those of other species. That factor which is in shortest supply for a given species is the limiting factor for that species. Alteration of the limiting factor may enable an area to support more of that species. Humans have the capacity to alter their environment.

5. Explain the flow of energy through a food pyramid.

   The sun is the source of energy on earth. Light energy flows through food chains and food pyramids, including producers (by photosynthesis), consumers and decomposers. Energy changes form as it flows through the system.

6. Demonstrate how cycles and rhythms, such as seasons, water, minerals and nutrients affect the biosphere.

   The interchange from matter to other forms of matter and the energy

The real voyage of discovery consists not in seeking new landscapes, but in having new eyes.

—Marcel Proust

flow within a system creates cycles of abundance and scarcity. Species react to these cycles in many ways, creating a dynamic ebb and flow within the biosphere.

7. Describe how diversity affects the dynamic balance of a community.

   There is considerable variety in nature. The greater diversity of species in an area increases the chances of that community's survival because of the potential for the community to adapt to change.

8. Predict different ways an ecosystem can change with or without the influence of people.

   Structure and systems change over various periods of time. Ecosystems may change due to succession, weather phenomena, erosion and weathering, sedimentation, fire, predation, volcanic activity, and other types of processes. Human actions may speed, slow or stop patterns of change or have no effect.

9. Generate examples of how people can use natural resources that are sustainable for both the people and the resource.

   Examples include sustainable yield forestry, wildlife management, agricultural methods which build, not deplete, the soil and which encourage the coexistence with natural plants and wildlife.

10. Design an environmentally sound system within a biome for humans to use natural resources and to manage the associated wastes.

    Designs could include examples from forestry, mining, indigenous peoples and recreation.

11. Compare and contrast how diverse cultures interact with the environment.

    Examples include: compare historical use of bison to current use of bison range for cattle production; or compare past fishing techniques to current techniques; or contrast the historical use of natural resources by indigenous cultures to the present use of resources.

12. Evaluate how human values, beliefs and human intervention have affected the environment in different places throughout history.

    An example could be deforestation of the tropical rainforests or plowing of Iowa's prairie habitat. Determine the human impact on the lands of Iowa and the county where you live.

13. Examine elements within the natural, built and social environments that exhibit structure and scale.

    From the smallest particles of an atom to the gigantic continental plates, structure and scale are the components that give dimension to the whole. A tree, a human and an automobile are each composed of structures that function together and interrelate with the system.

Standard—Appreciation: The learner will develop sensitivity, personal appreciation and a sense of environmental stewardship.

Indicators—The learner chooses to:

1. Act respectfully towards the natural and human environments.
2. Spend time in and with nature.
3. Respond to and reflect upon nature's intrinsic value.
4. Express environmental experiences in a creative way, such as in art, music, dance, writing, speaking, performing or photography.
5. Interact playfully and in harmony with the environment.
6. Bring the beauty and wonder of nature into the human-built environment.
7. Value humanity's role as an integral part of the natural world.
8. Examine and express personal perceptions of a place, an event or a living thing that demonstrate an appreciation of the environment.
9. Describe and demonstrate how the learner's values influence personal uses of resources.
10. Develop a sense of accomplishment by collaborating with others to improve upon the environment of their community.

Standard—Action: The learner will implement environmentally responsible actions after analyzing issues and developing problem-solving skills.

Indicators—The learner will choose one or more of the following:

1. Analyze an environmental issue or problem and initiate appropriate action to resolve the problem.
2. Develop and implement alternative environmental plans of action that may include persuasion, consumerism, political action, and physical management.
3. Choose and implement from alternatives and an environmental plan of action that contributes to an environmentally responsible lifestyle.
4. Evaluate an environmental action on the basis of its viability, goals and areas for improvement and initiate further action, if necessary.
5. Develop, implement and evaluate an environmental plan of action involving the classroom, school, community, state, national, or international strategy.
6. Collaborate with others to implement community service-learning projects.

Children are the messages we send into a future we will never see.

—Author Unknown

Once the emotions have been aroused - a sense of the beautiful, the excitement of the new and unknown, a feeling of sympathy, pity, admiration, or love - then we wish for the knowledge about the object of our emotional response... It is more important to pave the way for the child to want to know, than to put him on a diet of facts he is not ready to assimilate.

— Rachel Carson

Changing Learner Behaviors

Nationally many learner models promise to improve student learning in any educational area, not just environmental education. Most school districts will decide on a combination of carefully selected models, approaches and strategies for their improvement programs.

Often different strategies can be combined or integrated into one program. Some of these strategies may include: multiple intellects, mastery teaching, cooperative learning, collaborative training, higher order thinking, learning styles and modalities, brain-based hemisphere learning, the rigor and relevance framework of Dr. Richard D. Jones, Gardener's multiple intelligences, and others.

More specific to environmental education, there are components needed to change learner behaviors in a positive way. After examining decades of environmental education research, Hungerford and Volk listed these components in the article, "Changing Learner Behavior through Environmental Education", published in the *Journal of Environmental Education* in 1990. The following chart compares their list of components with some general areas discussed in this guide.

Changing Learner Behavior Through Environmental Education.	Areas in this Guide
Teach environmentally significant ecological concepts and the environmental interrelationships that exist within and between these concepts.	Knowledge Goal
Provide carefully designed and in-depth opportunities for learners to achieve a level of environmental sensitivity that will promote a desire to maintain a sustainable environment.	Appreciation Goal
Provide a curriculum that will result in an in-depth knowledge of issues.	Action Goal
Provide a curriculum that will teach the skills of issue analysis and investigation, as well as provide the time needed for the application of these skills.	
Provide a curriculum that will teach learners the citizenship skills needed for issue remediation as well as the time needed for application of these skills.	
Provide an instructional setting that increases learners' expectancy of reinforcement for acting in responsible ways in attempting to develop an internal locus of control in learners, for an "I can make a difference" attitude.	
Provide opportunities for learners to use the whole community to interact directly with the natural environment through use of outdoor classrooms, field trips to natural area, nature centers, residential education at outdoor centers, or other outdoor environmental education experiences.	Experiential and Residential Approaches
Provide the learner opportunity to extend into the community at large to use the human resources and the human-built world around them to develop knowledge, appreciate and understanding of their environment.	Integration Approach (also applies to other areas above)

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In Chapter 3, two models are described which considered this list of components in their design.

Supportive Strategies

Many strategies for teaching are supportive of environmental education. These current practices/programs may be integrated into any educational models. This diagram is not inexhaustive but does begin to show how many of these techniques are helpful in supporting the models and approaches for environmental education.

***Environmental Education Program Examples**

- Environmental Issues Instruction
- Food, Land & People
- Project Learning Tree
- Project WET
- Project WILD
- Project WILD/Aquatic

Assessment

Alternative or "authentic" assessment departs from the traditional norms of testing/evaluation. Following are a brief background on the nature of alternative assessment and some suggestions for applying these ideas.

Chapter 1

Do not try to satisfy your vanity by teaching a great many things. Awaken people's curiosity. It is enough to open minds; do not overload them. Put there just a spark. If there is some good inflammable stuff, it will catch fire.

—Anatole France

Traditionally in education, learners were tested for their ability to recall information by requiring them to respond to teacher-made or standardized tests, such as essay and multiple-choice examinations. Their success or failure in school depended almost exclusively on their ability to demonstrate, in fairly narrowly prescribed ways, their recall of facts and understandings.

Authentic assessment is a generic term that includes such specific innovations as alternative assessment, performance assessment, and portfolio assessment. Generally, authentic assessment attempts to measure learner accomplishments and mastery using a broader and more flexible inventory of tools. Such tools allow learners to demonstrate their competencies in ways that honor individual interests and learning styles, but still maintain expectations for achieving high levels of mastery.

Typically, authentic assessment involves challenging learners to do work that represents "real life" issues or problems, similar to what they would face as adult citizens, business people, community leaders, scientists or activists. Often this will be beyond the classroom walls. This is one of the strongest aspects of authentic assessment: it involves having learners apply their mastery of subject matter to things that are more relevant to their needs than more traditional educational tasks.

Following are some examples of authentic assessment.

- **Performance-based assessment** involves a form of learner evaluation based on the completion of certain, often complex, tasks. The learner may be asked to give a five-minute speech, produce a detailed plan or proposal to solve a problem, conduct an experiment; design, conduct and evaluate a survey, or write a story or a script for a play.

- **Portfolio assessment** involves having the student assemble a collection of her/his work on a particular subject or topic that has been done over a period of time, such as a semester or longer.

- **Project assessment** involves projects, done alone and with other learners, requiring learners to do significant pieces of work, such as research papers, fieldwork involving scientific analysis, musical performances, or the design and construction of working models. Project work may take older learners outside the confines of the classroom into the community or to work sites. Mentors and tutors, in addition to teachers, may be involved in guiding and judging learner's work. Projects provide situations in which personal qualities can be developed and evaluated, such as learning skills, capacity to organize and sustain work, judgment, and teamwork.

General Approaches

This chapter describes some general approaches to consider: experiential, residential and three integrated approaches. Educators may choose to use aspects of all of these approaches in their environmental education program; or they may use other alternatives.

The experiential approach is often used by environmental educators. It includes:

- actively engaging and involving the learner
- "hands-on" access to the environment
- exploring multiple solutions to a problem
- giving educators a facilitative and modeling role

A residential approach involves one or more nights at a facility that provides the opportunity to explore the environment. Most school residential programs involve learners at the fifth or sixth grade levels; however, it is appropriate for students in upper elementary and older. A residential approach:

- immerses learners in the real life of nature and ecology
- separates people from their everyday routines, and gives them unique opportunities for "special moments" of nature at night.

An integrated approach is a way to weave strands from different disciplines and strategies into an educational program. It:

- provides a dynamic approach to integrate subject area disciplines;
- stimulates the learner to address a topic using a holistic approach;
- focuses on relevant topics of high interest to the learner;
- stimulates a learning environment conducive to cooperative learning;
- addresses topical areas that are current at a local, regional or worldwide level.

Experiential Approach

The experiential approach may be used in a variety of situations, including open-ended inquiries in a classroom situation, a school site field trip, a field trip to a nearby area, or in an extended residential situation. In the experiential approach, the learner is exposed to stimuli that engage the learner in active involvement with their environment. Although the components of the environment are important in experiential learning, it is the sum total of the components and the concept that the whole is greater than the parts that is important in this approach.

To enable the learner to use the whole, a variety of learning strategies may be employed to engage the learner. Factual knowledge in a support role is useful, but it is the hands-on experience, observing, and the use of inquiry, that sets experiential learning apart from more traditional methods. The more

Chapter 2

What a joy it is to feel the soft, springy earth under my feet once more, to follow grassy roads that lead to ferny brooks where I can bathe my fingers in a cataract of rippling notes, or to clamber over a stone wall into green fields that tumble and roll and climb in riotous gladness!

—Helen Keller

9

Chapter 2

Our ability to perceive quality in nature begins, as in art, with the pretty. It expands through successive stages of the beautiful to values as yet uncaptured by language.

— Aldo Leopold

the learner becomes an actual part of the environment and assumes the role of participant in the environment, the greater the experiential experience

Prior to engaging in an experiential learning experience, certain skills may be developed and any fears or apprehensions the learner may have should be dispelled. However, the mystery of the unknown, "teachable," moment is often the element that creates the spontaneous response in the experiential learner stimuli and should be employed whenever possible in a non-threatening manner.

There are multiple methods, curricular programs, and instructional materials that utilize the experiential approach. These materials may be used exclusively or on an occasional basis, depending upon the situation. Simulations, open ended activities and field experiences create the conditions needed for experiential learning. Many environmental education workshops provide instructional strategies that enable the learners to grasp the essence of experiential learning. It is often the skill by the instructional leader that provides the conditions to place the learner in an experiential learning mode. This may invove the selection of appropriate activities, field experiences, or learning environments that allow immersion to take place.

Experiential learning is a powerful tool that frequently builds from awareness with knowledge, through sensing and exploration into the recognition of an issue or problem and may involve application through action by a variety of strategies to bring about change in behavior, perceptions, and/or reasoning.

At least one of the roots for the experiential approach to education can be found in the belief that genuine education comes about through experience. Such beliefs are at the heart of modern experiential education. Experiential educators generally believe that learning comes about not so much by goal-directed, predictable steps but by experience. Furthermore, the results of an experience are many, and may or may not reflect those expected by the educator. Experiential educators often see adventure and service as critical elements in the development of citizens that have both a sense of wonder and a sense of responsibility for both the natural and human-built worlds.

A fundamental difference, perhaps, between experiential learning and goal-directed learning, then, is that the outcome(s) are not always predictable. We may wish for learners on a wilderness trip, for example, to learn the names of twenty-five plants. In goal-directed learning we would make certain that learning opportunities were provided to achieve that outcome. An experiential educator, on the other hand, would be more likely to provide opportunities for learners to understand and experience the wilderness, hopefully to value it. If, as part of that valuing, they desired to know the names of plants, the educator would help them learn. If not, the educator would know that learners are learning other things that, at that point in time, are more important to them. Experiential education, then, is more open-ended in approach, perhap more multi-dimensional, more holistic, than other approaches to education.

This approach has its roots in a variety of settings and movements: progressive education, holistic education, vocational education, internships, career education, adventure programming, service learning, and others. It finds advocates in those who call for "hands-on learning" and in renewed interest in a "service learning" requirement for all learners. Aristotle expressed that *"...men of experience succeed even better than those who have theory without experience."*

But modern experiential educators define it as something well beyond

traditional vocational education. Richard Kraft perhaps puts it best: *"While traditional 'experiential' programs see the 'repair of the cycle' as the goal, end, or purpose of the activity (modern experiential educators see the cycle as but one of the many vehicles for helping the learner... gain insight into oneself, to approach learning as something intrinsic to the learner and not imposed by external sources."*

The theoretical and psychological foundations of experiential education are many and reflect the holistic nature of this approach. They most often include:

- a belief in the educator as facilitator;
- the involvement of the learner in the selection of what is to be learned;
- a belief that there may be many "right" solutions to a problem.

An excellent summary of the foundations of experiential education may be found in *The Theory of Experiential Education*, R. Kraft and M. Sakofs, eds., Assoc. for Experiential Education, Box 249-CU, Boulder, CO 80309.

When using this approach, note that the experience, not a problem or issue, is at the center of the diagram. Note also that the outcomes are connected by dotted, not solid lines. This implies that these are only possible outcomes, limited to what is written here. Notice that the outcomes/learnings are not divided into subjects such as science, math, etc., but rather reflect the holistic nature of this approach.
Does such an approach match the outcomes for environmental education? The answer is "yes" since the outcomes are holistic themselves and not limited to bits and pieces of content knowledge.

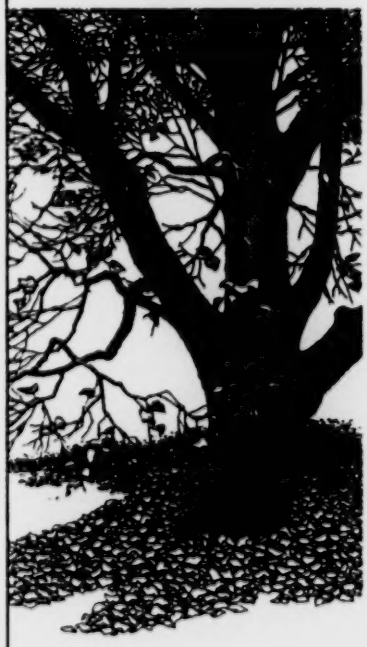
Does this example preclude an issues-based approach? No, not unless the learners' examination of an environmental issue has a predetermined outcome. It is conceivable that, under an experiential approach, learners may learn things differently than the educator desires.

ONE DAY TRIP TO A LOCAL WETLAND
AWARENESS
• Very limited number of wetlands left
• Differing types of animals & plants
• Place for insects to hatch
• Teeming with activity above and below water
• Hummocking
SENSES
• Wetness
• Sponginess
• Color
• Constant movement
• Insect bites
• Bird sounds
• Amphibian sounds
• Insect Sounds
• Water & Earth smells
• Joy!
KNOWLEDGE
• Plants grow here, some underwater
• Animals found here
• Upland adjacent to wetland
• Important place for nesting waterfowl
• Wetlands are scarce
• People drain wetlands for many purposes
• Some plants float
• Some plants eat insects
• Toads release water when picked up
• Dragonflies don't bite
• Mosquitoes are important
ACTION
• Write to legislators
• Building nesting habitats for birds
• Public relations done by learners
• Clean litter out of Wetlands
• Plant windbreak or grass filter strips to control erosion into wetlands
SKILLS
• Balancing on a log
• Using binoculars
• Using a plant identification
• Telling birds by their flight
• Canoeing
• Safety around water
• Listening and watching
• Design an erosion control plan

Chapter 2

To me an ancient cottonwood is the greatest of trees because in its youth it shaded the buffalo and wore a halo of pigeons, and I like a young cottonwood because it may some day become ancient.

—Aldo Leopold



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Chapter 2

Residential Environmental Education

- immerses people in the real life of nature and ecology
- effective for all outcomes: one of the best models for appreciation
- separates people from everyday routines and gives opportunities for "special moments" of nature at night
- can include a variety of learning models

Residential Approach

A residential approach involves the use of an overnight facility for an environmental education experience. The facility provides the opportunity to discover through "hands-on" experiences the natural environment and the implementation of action, knowledge and appreciation. A residential approach may provide the opportunity to use all models and approaches described in this document.

Residential education approach:

- builds on the benefits of experiential education by immersing learners in the real life of nature and ecology
- provides alternatives for learners who learn more easily with concrete experiences and movement
- separates learners from their everyday home environment and routines
- capitalizes on the teachable moments provided by nature
- permits the educator to perceive the whole child and often builds rapport between the learner and the educator

- facilitates learning bridges that may be exploited in a variety of learning situations
- represents only one facet of an environmental education program, and enriches the educational process

"Ninety-five percent of the students felt that the Outdoor School experience is one that every sixth grade student should have, and 90 percent indicated that the Outdoor School was better than all of their other field trip experiences during twelve years of schooling." This statement is from a survey of twelfth grade students who had previously attended a three- to five-day residential environmental education program in California when they were in sixth grade. The survey also showed the Outdoor School program had a positive, lasting impact on students in the areas of interest in natural sciences, attitudes about the environment and development of positive personal relationships.

The central theme of *Fifty Years of Resident Outdoor Education: 1930-1980* is "that there is need for direct contact with the environment; that some learning makes a deeper impact and is retained longer when a concept or an object is discovered, observed, sensed, and interpreted in the natural setting. This conviction lies behind the rapid growth of programs in the outdoors."

Also, several studies, including a review of the literature by Crompton and Sellar (1981), support claims that most outdoor education experiences help improve social factors such as self-concept, peer socialization, racial integration, and educator-learner relationships. Their research review also found that the out-of-doors is a better place to learn than the classroom *if* the subject is closely related with the out-of-doors and *if* the outdoor education experience is long enough.

Ecological concepts and environmental sensitivity have traditionally been key components in outdoor education programs, whether they are overnight or day only experiences. However, research suggests that residential environmental education programs are more successful at influencing environmental attitudes than day only programs. For a summary of nine studies which support this, refer to the report, *Feasibility Assessment for a Residential Environmental Education Center in Eastern Iowa.*

Integrated Approaches

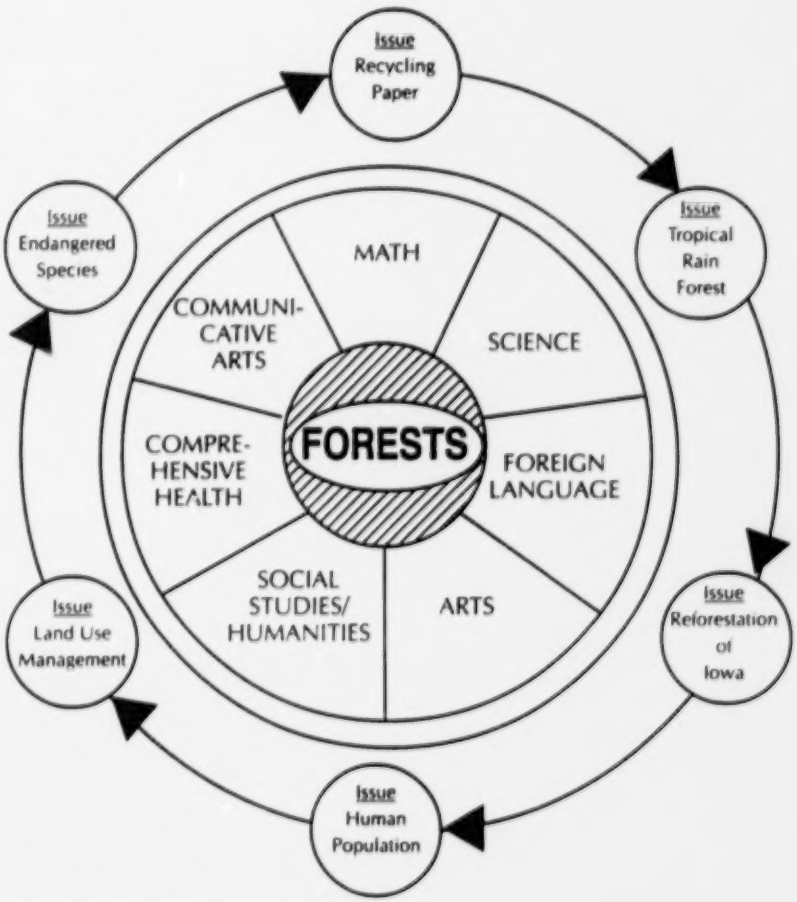
Approach A: Thematic

The thematic approach may be useful for integrating environmental education into a classroom or an educational program. The diagrams on pages 14 and 15 are examples of integrating a forest theme using several disciplines. The educator may then go on to develop several "key ideas" based on learner interests and current environmental happenings at local, regional, national, and/or worldwide levels. The theme provides the excitement for learning and is relevant to learners' needs for discovery, exploration, skill development, knowledge development, appreciation and action.

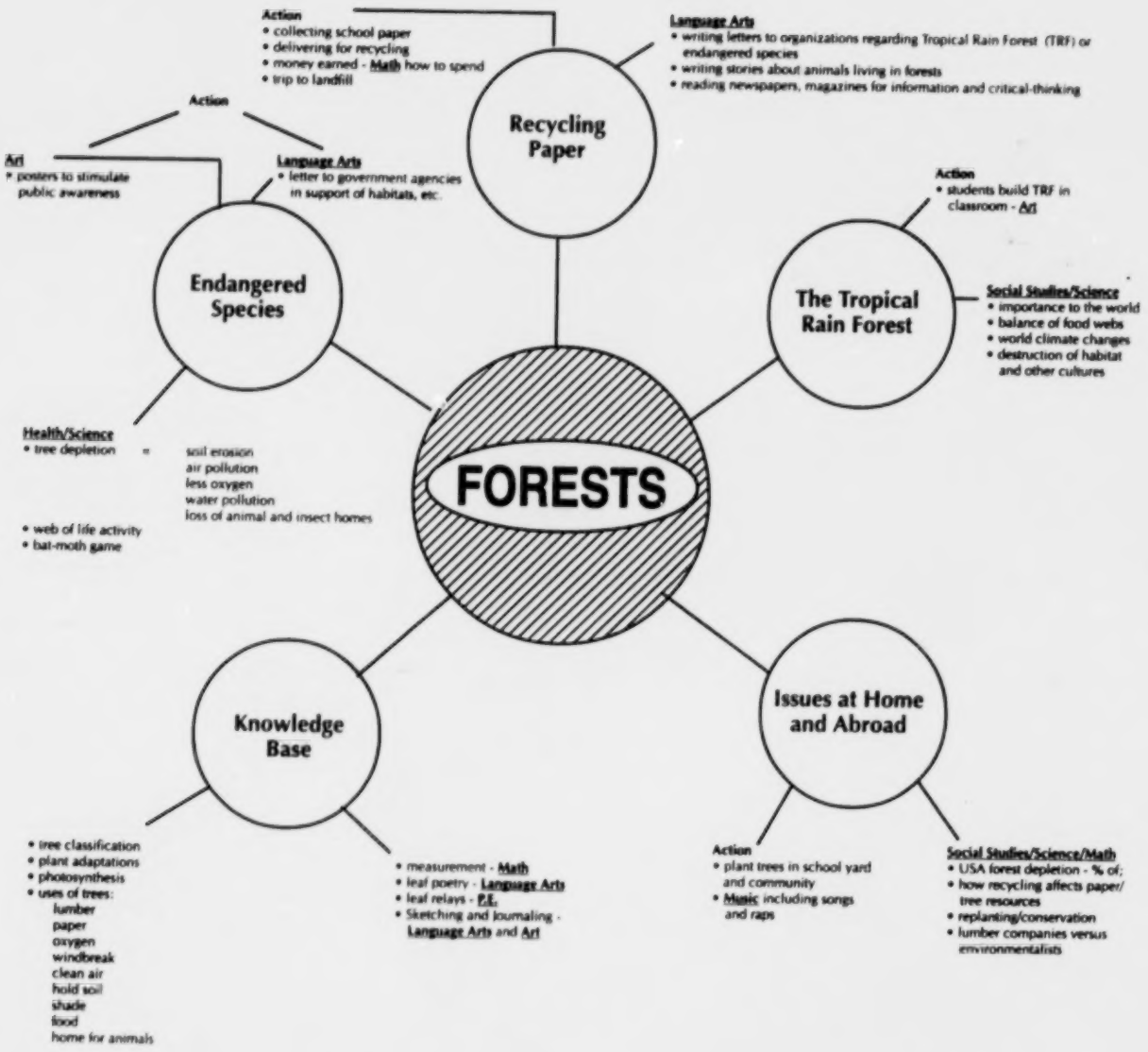
Chapter 2

Thematic Approach

A **thematic** or **case study** approach to teaching responsible environmental action is familiar and has been proven to be successful at all grade levels. "Forests" is used as an example of a theme which relates to a number of issues which may be studied. An issue is defined as a problem about which people (players) have different opinions because of the beliefs and values. Each issues may revolve and relate to multiple academic areas.



Thematic Approach Example



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Approach B: Interdisciplinary Team

The interdisciplinary team approach is a holistic view centered on a theme used in several classrooms within a school building or grade level. This approach is broader in scope and relies on educator collaboration. Every educator brings her/his expertise to the team planning sessions as themes or "key ideas" are developed. Many disciplines and educators are needed in this process to determine the best methods to accomplish the three environmental education outcomes of knowledge, appreciation and action for their learners.

Interdisciplinary Team Approach Example

Rain Forest Destruction
MATH
• sq. miles/hectacres of land destroyed
• scale model of RF
• economic benefits detriments
SOCIAL STUDIES/ HUMANITIES
• impact on native people culture
• history of other forest depletions
• projections of cause and effect impact on world geographical locations
FOREIGN LANGUAGE
• effective communication with RF governments
• communication of impact with native people
• ability to understand a different culture
COMPREHENSIVE HEALTH
• medical plant destruction
• healthful foods raised in RF
• climate changes
SCIENCE
• impact on food chains/webs
• endangered species
• undiscovered flora and fauna
• species diversity
COMMUNICATIVE ARTS
• writing to organizations that lead to destruction
• writing to groups that protect RFs
• pen pals in RF areas
• reading books about rain forests
• creating a play
ARTS
• Henri Rousseau paintings
• beauty of plants, animals, insects
• creation of RF in classroom
• Rainforest rap music

1. ***How did you achieve knowledge?***

2. ***How did you achieve appreciation?***

3. ***How did you achieve action?***

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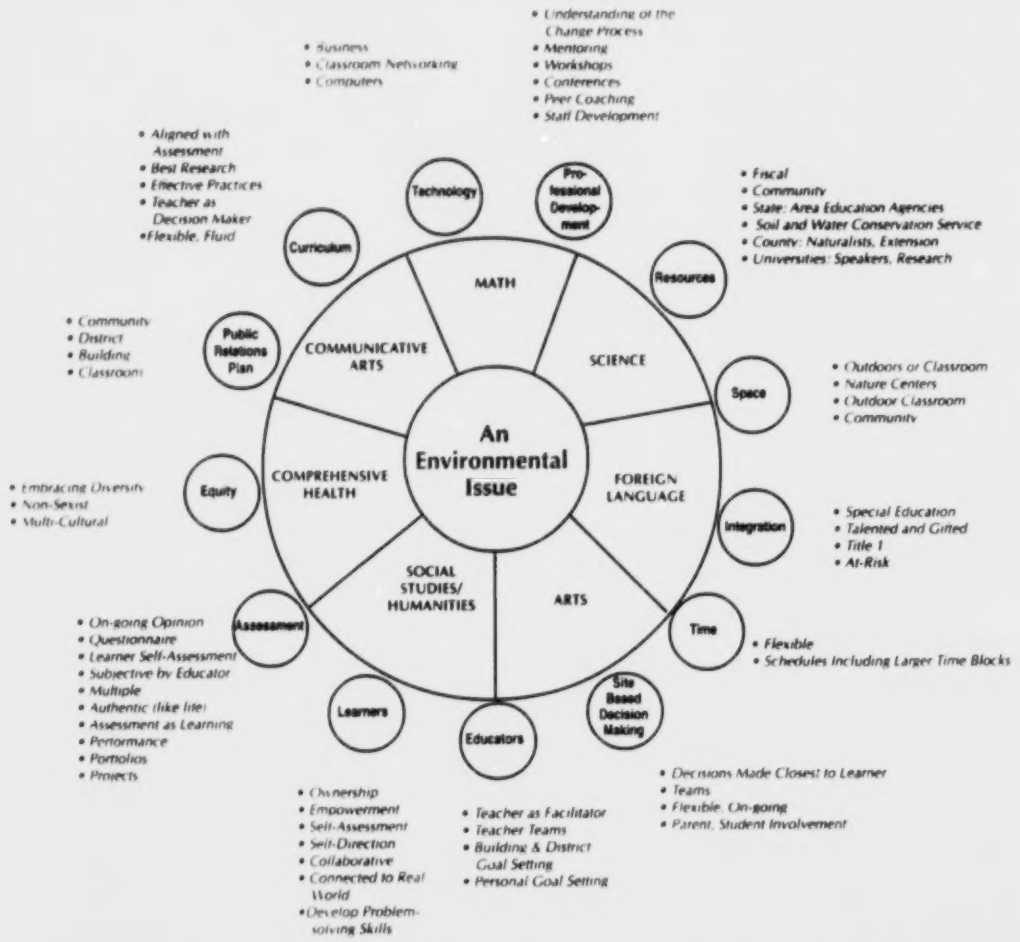
Approach C: Transdisciplinary Learning

Transdisciplinary learning is defined in this document as a curricular approach that transcends the disciplines by incorporating them around themes, issues, or problems to solve. When considering environmental education, this view is both useful and pertinent for educators planning integration techniques. This diagram demonstrates a comprehensive picture of education and a transformation process. It provides a sense of balance and stability as educators plan for the future of all learners.

Transdisciplinary Approach Example

Transdisciplinary Learning: Environmental Issues

This diagram encompasses the thematic approach. The study of an environmental issue is based upon and unites the learning experiences and resources of most disciplines and other aspects of educational practice.



The outside circles on this model continually revolve around the large circle.

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Chapter 2

Now I see the secret of the making of the best persons. It is to grow in the open air, and to eat and sleep with the earth.

— Walt Whitman

Possible Steps in Integrating the Curriculum

Educators may choose to follow some or all of the steps of the integration process. The purpose is to assist in pre-planning for an effective approach this is long-range and comprehensive by looking at models, approaches, resources, skills, experience, and evaluation.

Step 1 **Make an inventory of materials, visuals, to be used with environmental education.** ***Also survey:***

- Educator resources listed in the appendix that focus on environmental education activities, ideas, materials
- Books, magazines, field guides, Internet, e-mail, and computer programs
- Stored equipment and teaching materials
- Peers who currently teach environmental education or individuals who have available resources, including community resources
- What additional items or resources will be needed?

Step 2 **The educator and the learners survey a list of possible ideas, topics, issues, themes, background and interests of the educators that indicate and utilize the interest of the learners.** ***Also helpful at this point:***

- References the learners have at home that could be brought to the classroom
- Prior knowledge and abilities of the learners involved
- Relevance of this list of ideas to the learners, the community and their real world significance and application

Step 3 **Based on Steps 1 and 2, the educators and learners decide which idea would work best for their purposes; then the process of integration should be determined and the criteria and structure outlined.** ***The points to consider are:***

- Does the idea involve others outside the classroom? If so, provide the necessary information to those people or request their assistance. Ask for help to discover if other learners and educators wish to be included in a team teaching effort.

- Determine what core subject areas support the investigation or the selected environmental topic and draft a plan of integration
- Determine the element of learner empowerment: does the idea lead to an action phase?

Step 4 **Adopt an approach or model and develop a format for the integration process.** ***This could have some or all of the following components:***

- Title, purpose, and overview of the unit; a short lesson description for each day
- Inclusion of core subjects that will be used; specify how the environmental content will be integrated into each core subject
- A list of the learner objectives
- A list of the materials and time needed for each lesson
- Draft of a learning cycle whereby the program goals based on knowledge, appreciation, and action are met by the learners using the indicators that support the chosen topic
- Design appropriate assessment techniques that fit the environmental topic chosen
- A list of extended activities that would enable the advanced learners to go beyond the class goals

Step 5 **Identify the skills and experiences the learners will use and need.** ***Refer to the appendix for a listing of some of the more useful skills and experiences that should be incorporated into the environmental education unit. Other processes might also be considered:***

- Defining key terms and phrases
- Investigating causes and solutions to environmental problems
- Contrasting opposing viewpoints on issues
- Gaining outdoor experiences relative to the topic
- Evaluating information and opinions
- Evaluating local, regional, national, and global needs

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While we are born with curiosity and wonder and our early years full of the adventure they bring, I know such inherent joys are often lost. I also know that, being deep within us, their latent glow can be fanned to flame again by awareness and an open mind.

— Sigurd Olson

Step 6 **As the unit unfolds for the educator, "step outside" the process and take time to reflect on the attitudes, input, and opinions of the learners. Record the suggestions that would improve the entire procedure for use another time.**

Step 7 **Assessment techniques.**

- **Performance-based assessment** involves a form of learner evaluation based on the completion of certain, often complex, tasks. The learner may be asked to give a five-minute speech, produce a detailed plan or proposal to solve a problem, conduct an experiment, design, conduct and evaluate a survey, or write a story or a script for a play.

- **Portfolio assessment** involves having the student assemble a collection of her/his work on a particular subject or topic that has been done over a period of time, such as a semester or longer.

- **Project assessment** involves projects, done alone and with other learners, requiring learners to do significant pieces of work, such as research papers, fieldwork involving scientific analysis, musical performances, or the design and construction of working models. Project work may take older learners outside the confines of the classroom into the community or to work sites. Mentors and tutors, in addition to teachers, may be involved in guiding and judging learner's work. Projects provide situations in which personal qualities can be developed and evaluated, such as learning skills, capacity to organize and sustain work, judgment, and teamwork.

Chapter 3

Two Models

Two models that put together several components of environmental education are discussed in this chapter.

The **Issues Investigation Model** uses an environmental issue as the focus for taking students through four levels: issue analysis, ecological foundations, issue investigation, and responsible action. The training team from the University of Northern Iowa suggests using an integrative approach with either a single classroom or group of educators working cooperatively. Four issue case studies are outlined on the following pages.

Environment as the Integrating Concept for Learning (EIC) is an educational approach that uses the school environment and the surrounding community as a framework for hands-on, collaborative and student-centered instruction. Researchers studied 40 schools nationally, and found students learn more effectively within an environmentally-based context than within a traditional educational framework. Three Iowa schools were included in the study: Waterville Elementary in the Allamakee CSD, Chariton Middle School in the Chariton CSD, and Metro High School in the Cedar Rapids CSD. This section briefly describes the project, results and main concepts.

It is important to remember we cannot become what we need to be by remaining what we are.

—Max Depree

Application of Issues Investigation Model

The Issues Investigation Model presents the instructional plan implementing the study of an environmental issue. The **four levels** of learning experience take the learner through a model of issue analysis, an introduction of the ecological concepts needed for the study of an issue, the study of a particular issue and preparation for the implementation of action to help resolve the issue.

The ultimate environmental education goal of "responsible student action" is achieved when educators complete the four levels of the **Learner Model** with their learners. This is effectively accomplished by using a thematic (case study) approach. The topic of the environmental issue case study may be chosen by the educator or the educator and learners. If several teachers are cooperatively teaching the unit, the choice should be made by the whole team.

The model is most flexible and may be used effectively in the self-contained classroom or by a small or large group of educators working cooperatively. Teachers of middle schools or high schools who have a subject based teaching assignment will find some degree of cooperative or team teaching to be most effective because of their contribution of special expertise. The study of an environmental issue draws upon many disciplines and is the ideal vehicle for the integration experience to accomplish transdisciplinary learning.

The first time the model is used it is important that the sequence of Levels I through IV be followed. After gaining familiarity with the model, educators may wish to exchange the sequence of Levels I and II; and if learners are well grounded in Levels I and II from previous experiences, they may approach a new issue directly in Level III. It is essential that learners approaching Level III have a thorough understanding of the components and interaction of a simple environmental issue and major ecological concepts.

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Chapter 3

Give what you have. To someone, it may be better than you dare to think.

—Henry Wadsworth Longfellow

In order to gain an understanding of the components and interaction of an environmental issue, it has been found that a study of ***The Lorax*** by Dr. Seuss provides an ideal story model for **Level I**. It presents a simple issue with few sub issues, a small number of players and a chance to analyze the players' positions and beliefs and the values which determine their beliefs and positions. Other resources such as ***Wump World*** or simple articles from current periodicals may be chosen for this model study.

The **Level II** ecological concepts should be chosen and studied to provide the basic understandings particularly needed for the case study. Outdoor experiences, field trips, hands-on science, and social studies experiences are particularly appropriate strategies for this level.

With the base of understanding gained in Levels I and II, learners are prepared to analyze the issue chosen for **Level III**. Because most issues have such a great quantity of relevant resource material, cooperative learning is helpful. The diversity of primary (e.g., opinionnaires) and secondary (e.g., newspapers) resources provide learners a wide range of opportunity in choice of learning approaches.

Awareness of environmental issues does little to resolve them. Learners need to master action skills (**Level IV**) so that they may use them to feel the empowerment of success. **Learners can learn that they can make a difference and can successfully take "responsible environmental action."**

Issues Investigation Model

Local, regional, national and worldwide topics are outlined to present examples of issue case studies. It is essential that a local topic be related to the broader scene and that worldwide topics be directly related to the lives of the learners. The outlines offer a beginning for transdisciplinary studies with the end points being limited only by time, resources and specific learner interests.

This instructional model provides four levels, or steps, through which the learner should progress.

Level I: Issue Analysis
- understanding the basic components of an issue

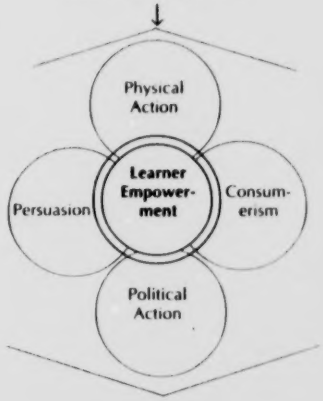
Level II: Ecological foundations
- experiencing, through activities, research and simulations, the underlying ecological concepts of an issue

Level III: Issue Investigation
- developing critical thinking skills by analyzing all components of an issue

Level IV: Responsible Action
- learning the responsible avenues for achieving change

The implementation of the investigation model may require staff inservice. Support cadres for staff development are available from the Center for Energy and Environment, University of Northern Iowa, Cedar Falls, Iowa 50614-0293. Contact the Director of Environmental Issues, Office of Continuing Education.

ISSUES INSTRUCTION MODEL: Issue Investigation

Level 1 →	Level II →	Level III →	Level IV
Issue Analysis (The Model)	**Ecological Foundation (Examples of Concepts)**	**Issue Study (The Case Study or Theme)**	**Responsible Environmental Action**
Problem Identification ↓ Issue Identification ↓ Issue Investigation ↑ Players: ↑ Events Positions ↑ Beliefs ↑ Values • aesthetic • ecological • economic • cultural • recreational • etc.	• Ecosystems • Flow of Energy • Cycles • Diversity • Population Dynamics • Limiting Factors • Interrelationships/Connections • Adaptation • Sustainability • Bioregions • Change • Human Built Environment	Problem Identification ↓ Issue Identification ↓ Issue Investigation ↑ Players: ↑ Events Positions ↑ Beliefs ↑ Values • aesthetic • ecological • economic • cultural • recreational • etc.	Skill Development ↓  ↓ Implementation, e.g., Service Learning - plant trees Consumerism - buy recycled Political - write a senator Persuasion - talk to a friend

. And forget not that the earth delights to feel your bare feet, and the winds long to play with your hair.

—Kahlil Gibran

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ISSUES INSTRUCTION MODEL EXAMPLE NATIONAL ISSUE CASE STUDY: Water

Level 1 → Level II → Level III → Level IV

Issue Analysis (The Model)

Problem Identification

- Learners read uncomplicated articles, www books depicting problems, e.g., *The Lorax*, *Wump World*, *Scholastic*, *Newsweek*, *Time*, *etc.*
- Learners identify environmental problems, e.g., deforestation, pollution of water, air, soil erosion.

↓

Issue: Identification

- Learners identify and state the issue as, "Should..." e.g., "should the truffula trees be cut?" *The Lorax*.

↓

Issue: Identification

- Who are the players? e.g., (Onceler) (Lorax)
- What are their positions? e.g., (yes) (no)
- Why do they hold these positions? (beliefs)
- What are the values that drive these beliefs? (economic, cultural, ecological, aesthetic, etc.)

Ecological Foundation (Examples of Concepts)

- Learners experience ecological concepts related to water usage through research, lab activities and simulations (stream tables, percolation tests, hydro-models).

↓

Concept Examples

- water cycle
- groundwater/surface water
- soils/rocks
- succession
- biomes: salt/fresh water
- human impact
- food webs

Educator Resources:

- Project WET
- Project WILD Aquatic
- NatureScope:
  - Wading into Wetlands
  - Diving into Oceans
  - Wild About Weather
- For a more complete listing, see the Appendix of this document.

Issue Study (The Case Study or Theme)

Problem Identification

- Learners research problems involving water, e.g., use, quality, availability, pollution, rights.

↓

Issue Identification

- Learners identify a water-related environmental issue; e.g., "Should wetlands be drained for urban development?"
- Learners use webbing to analyze sub-issues.
- Learners gather more information from various primary and secondary sources.

↓

Issue Investigation

- Who are the players? e.g., (developers, hunters, preservationists).
- What are their positions? (yes) (no)
- Why do they hold their positions? (beliefs)
- What are their values? (cultural) (economic)
- SKILLS—role-playing, debating, interviewing, data gathering.
- See a more comprehensive list in the Appendix of this document.

Responsible Environmental Action

- After analysis of an issue, the learner should want to take personal action to support their viewpoint.

Skill Development

- Learners are led to recognize differences between responsible and irresponsible actions.
- Learners study methods of achieving change.

Implementation

Persuasion = letters, posters, plays, discussion (parents).
Consumerism = power of purchase, consumer conservation, boycotting.
Political Action = letter writing, voting, campaigning, lobbying.
Service Learning = recycling, planting, preserving/protecting.

- Learners investigate individual and group action.
- Learners progress to taking a personal responsible action relative to their perception of the issue.

ISSUES INVESTIGATION MODEL EXAMPLE - WORLDWIDE ISSUE CASE STUDY: Tropical Rain Forest

Level 1 → Level II → Level III → Level IV

Issue Analysis (The Model)

Problem Identification

- Learners read uncomplicated articles, WWW books depicting problems; e.g., *The Lorax, There's an Owl in the Shower, Scholastic, Newsweek, Time,* etc.
- Learners identify environmental problems, e.g., deforestation, pollution of water, air, soil erosion

↓

Issue Identification

- Learners identify and state the issue as, "Should ...," e.g., "Should the truffala trees be cut?" *The Lorax.*
- Cutting old growth forests.
- Mining in rain forests.

↓

Issue Investigation

- Who are the players? e.g., (Onceler) (Lorax)
- What are their positions? e.g., (yes) (no)
- Why do they hold these positions? (beliefs)
- What are the values that drive these beliefs? (economic, cultural, ecological, aesthetic, etc.)

Ecological Foundation (Examples of Concepts)

- Learners experience ecological concepts related to the Rainforest through simulations (building classroom rainforest), research and activities

↓

Concept Examples:

- diversity
- energy flow
- community
- succession
- niche
- interdependence
- human impact
- biome: tropical rainforest

Educator Resources:

- NatureScope: The Tropical Rainforest
- 3-2-1 Contact: You Can't Grow Home Again - Video.
- National Geographic videos and periodicals
- Fiction/non-fiction books
- Simulation games: WILD, PLT
- Rainforest Action Network
- Save the Rainforest
- For a more complete listing, see the Appendix of this document
- WWW
- E-computer programs

Issue Study (The Case Study or Theme)

Problem Identification

- Learners gather information about rainforest problems using current periodicals, texts, videos, or activities, e.g., slash and burning rainforest for agriculture.

Issue Identification

- Learners identify the environmental issues of the rainforest, e.g., "Should the rainforest be slashed and burned for agriculture?"
- Learners may use webbing to analyze and depict sub-issues, e.g., endangered species, soil erosion, indigenous people, weather changes.
- Learners gather more information from various primary and secondary sources.

Issue Investigation

- Who are the players? e.g., (indigenous people) (ranchers/farmers)
- What are their positions? (yes) (no)
- Why do they hold these positions? (beliefs)
- What are their values? (cultural) (economic)
- SKILLS — role-playing, debating, interviewing, data gathering.
- See a more comprehensive list in the Appendix of this document.

Responsible Environmental Action

- After analysis of an issue, the learner should want to take personal action to support their viewpoint.

Skill Development

- Learners are led to recognize differences between responsible and irresponsible actions.
- Learners study methods of achieving change.

↓

Implementation

Persuasion = letters, posters, plays, discussion (parents)
Consumerism = power of purchase, consumer conservation, boycotting.
Political Action = letter writing, voting, campaigning, lobbying.
Service Learning = recycling, planting, preserving/protecting.

- Learners investigate individual and group action.
- Learners progress to taking a personal, responsible action relative to their perception of the issue.

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ISSUES INVESTIGATION MODEL EXAMPLE - REGIONAL ISSUE CASE STUDY: Solid Waste Management

Level 1 → Level II → Level III → Level IV

Issue Analysis (The Model)

Problem Identification

- Learners read uncomplicated articles, newsletters, books depicting problems; e.g., *The Lorax, Wump World, Scholastic, Newsweek, Time, WWW (E-groups)*
- Learners identify environmental problems, e.g. deforestation, pollution of water, air, soil erosion.

↓

Issue Identification

- Learners identify and state the issue as, "Should...," e.g., "Should the truffala trees be cut?" *The Lorax*.

↓

Issue Investigation

- Who are the players? e.g., (Onceler) (Lorax)
- What are their positions? e.g., (yes) (no)
- Why do they hold these positions? (beliefs)
- What are the values that drive these beliefs? (economic, cultural, ecological, aesthetic, etc.)

Ecological Foundation (Examples of Concepts)

- Learners experience ecological concepts related to solid waste management through lab activities, research and simulations.

↓

Concept Examples:

- soils/rocks
- surface/groundwater
- water cycle
- mineral cycles
- food webs
- population dynamics
- impact of humans

Educator Resources:

- NatureScope: Pollution: Problems and Solutions.
- Food, Land & People
- Project Learning Tree
- For a more complete listing see the Appendix of this document.

Issue Study (The Case Study or Theme)

Problem Identification

- Learners investigate problems concerning solid waste management. e.g., recycling, groundwater contamination, landfills, incineration, composting.

↓

Issue Identification

- Learners identify environmental issues regarding solid waste management. e.g., "Should the four-county area cooperatively develop a waste incineration facility?"

↓

Issue Investigation*

- Who are the players? e.g., (county supervisors, citizens, industry)
- What are their positions? (yes) (no)
- Why do they hold these positions? (beliefs)
- What are their values that cause these beliefs? (cultural) (economic)
- SKILLS -- role-playing, debating, interviewing, data gathering.
- For a more comprehensive list see the Appendix of this document.

Responsible Environmental Action

↓

ISSUES INVESTIGATION MODEL EXAMPLE - LOCAL ISSUE CASE STUDY: Land Use

Level 1 → Level II → Level III → Level IV

Issue Analysis (The Model)

Problem Identification

- Learners read uncomplicated articles or books depicting problems; e.g., *The Lorax*, *Wump World*, *Scholastic*, *Newsweek*, *Time*, WWW, etc.
- Learners identify environmental problems, e.g. deforestation, pollution of water, air, soil erosion.

↓

Issue Identification

- Learners identify and state the issue as, "Should...," e.g., "Should the truffala trees be cut?" *The Lorax*

↓

Issue Investigation

- Who are the players? e.g., (Onceler) (Lorax)
- What are their positions? e.g., (yes) (no)
- Why do they hold these positions? (beliefs)
- What are the values that drive these beliefs? (economic, cultural, ecological, aesthetic, etc.)

Ecological Foundation (Examples of Concepts)

- Learners experience ecological concepts related to land use issues through lab activities, research and simulations.

Concept Examples:

- succession
- diversity
- community
- interdependence
- soils/permeability
- surface/groundwater
- human impact
- biotic/abiotic interaction
- energy flow/food webs
- biome: grassland and temperate deciduous forest.

Educator Resources:

- Project WILD/Aquatic WILD
- Project Learning Tree
- NatureScope: Trees Are Terrific!
- Lines on the Land
- Food, Land and People
- For a more complete listing see the Appendix of this document.

Issue Study (The Case Study or Theme)

Problem Identification

- Learners identify local land use problems. e.g., habitat loss, soil erosion, draining prairie potholes, sinkholes (geology).

↓

Issue Identification

- Learners identify a land use issue. e.g., "Should a shopping center be built on the farmland south of town?"
- Learners use webbing techniques to identify and depict sub-issues.
- Learners gather more information from various primary and secondary sources.

↓

Issue Investigation

- Who are the players? e.g., (farmers, developers, conservationists)
- What are their positions? (yes) (no)
- Why do they hold these positions? (beliefs)
- What are their values that cause these beliefs? (cultural) (economic)
- SKILLS — role-playing, debating, interviewing, data gathering.
- For a more comprehensive list see the Appendix of this document.

Responsible Environmental Action

- After analysis of an issue, the learner should want to take personal action to support their viewpoint.

Skill Development

- Learners are led to recognize differences between responsible and irresponsible actions.
- Learners study methods of achieving change.

↓

Implementation

Persuasion = letters, posters, plays, discussion (parents)
Consumerism = power of purchase, consumer conservation, boycotting.
Political Action = letter writing, voting, campaigning, lobbying.
Service Learning = recycling, planting, preserving/protecting.

- Leaners investigate individual and group action.
- Learners progress to taking a personal, responsible action relative to their perception of the issue.

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Chapter 3

Environment as an Integrating Context (EIC) "Closing the Achievement Gap"

The EIC frameworks for evaluating EIC Programs on the following pages were developed from a document called "Closing the Achievement Gap." The organization is funded by The Pew Charitable Trusts and administered by the Council of Chief State School Officers. *"Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning"* is a publication authored by Dr. Gerald Lieberman and Linda Hoody. It provides a complete report on EIC and is accompanied by a video. It can be obtained from Science Wizard (619) 676-0273 or e-mail: sciencewizards@home.com This document was mailed to all school superintendents in Iowa in the 98-99 school year.

Definition: Environment as the Integrating Context for Learning (EIC) is an educational approach that uses the school environment and the surrounding community as a framework for hands-on, collaborative and student-centered instruction.

Disciplines Covered: As an integrated teaching method, EIC brings together traditional subjects — language arts, math, social studies and science — so that teachers reinforce each others' efforts to achieve their discipline-specific educational goals. Using this approach, EIC teaching teams provide their students with both specialized disciplinary knowledge and a comprehensive understanding of the natural and social systems that constitute their community.

EIC "Environment:" The "environment" in EIC is defined by the school's locale, resources, and student needs. Therefore, it varies from school-to-school: it may be a river, a forest, a city park or an asphalt playground, depending upon the socio-cultural setting and natural ecosystems in a given community.

Overall Findings: The study results indicate that students learn more effectively within an environmental-based context than within a traditional educational framework. Benefits observed in EIC-based programs include the following:

- Better performance on standardized measures of academic achievement.
- Increased grade point averages (GPAs).
- Reduced discipline and classroom management problems.
- Increased engagement and enthusiasm for learning.
- Greater pride and ownership in accomplishments.

Researchers: The study was designed by the State Education and Environment Roundtable, a cooperative organization of education agencies from 12 states working to improve student learning by integrating the environment into K-12 curricula and school reform efforts.

Scope of Research:

- The study's results are based on a series of in-depth interviews and surveys of teachers, principals, school district staff, students and community members from K-12 schools.K-12. During the study, researchers conducted over 650 interviews.

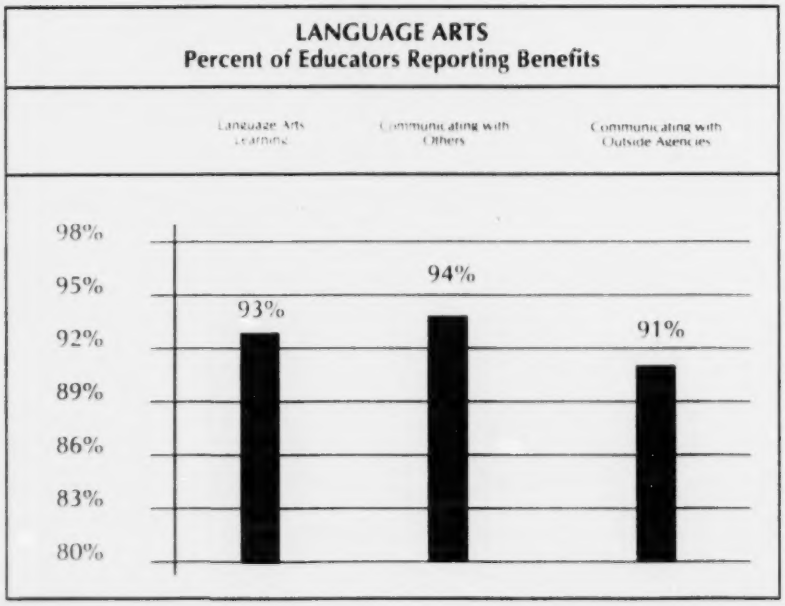
- Forty schools participated in the study from the Roundtable's 12-member states, including: California, Colorado, Florida, Iowa, Kentucky, Maryland, Minnesota, New Jersey, Ohio, Pennsylvania, Texas, and Washington. One school in the state of Oregon also participated.
- The research was conducted over a three-year period.

Impetus for Research:

- The study was the result of the researcher's discovery that few studies of environment-based education held evidence relevant to determining the educational efficacy of environment-based teaching methods.
- Researchers found existing studies provided limited insight into the effects of an environment-based learning context on the overall educational experiences of students.

Language Arts

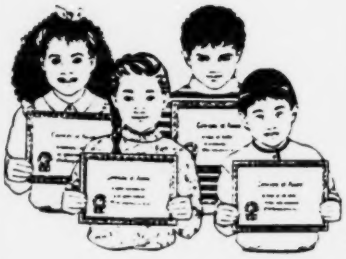
- The study indicates that students in EIC classrooms improve their language arts skills beyond those of their peers taught in a traditional setting.
- Survey data collected during the study indicate that educators saw significant student improvements in the following areas:



Chapter 8

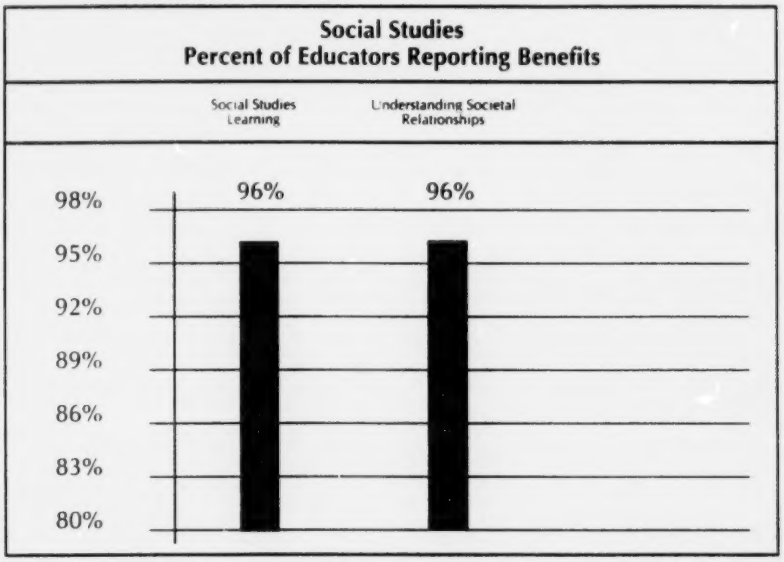
The land belongs to the future... that's the way it seems to me. How many names on the county clerk's plat will be there in fifty years? I might as well try to will the sunset over there to my brother's children. We come and go, but the land is always here. And the people who love it and understand it are the people who own it — for a little while.

—Willa Cather



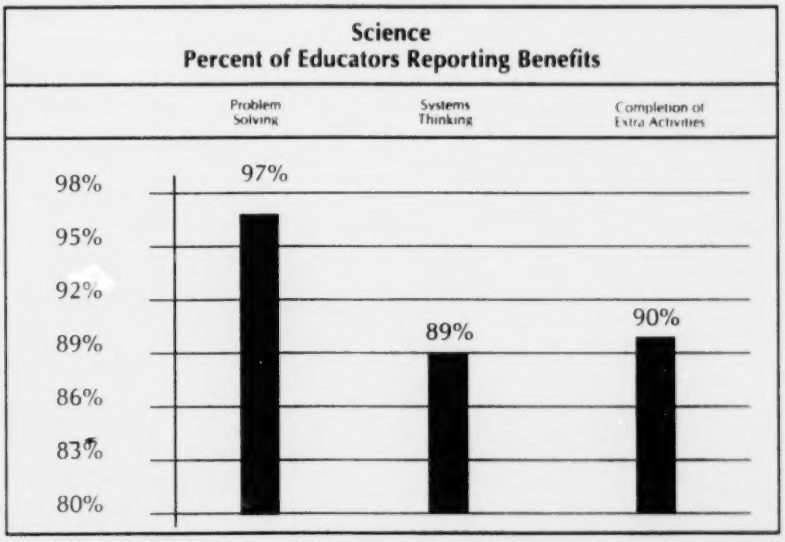
Social Studies

- The study shows that EIC students more fully understand the complex relationships and connections among individuals, communities and society because they have the chance to apply their social studies knowledge.
- Survey data collected during the study indicate that educators saw significant student improvements in the following areas:



Science

- Results from the study indicate that EIC students more effectively master scientific knowledge and skills and achieve a deeper understanding of scientific concepts and processes than students in a traditional setting.
- It also indicates students perform better on standardized measure of science achievement and demonstrate greater excitement about learning science than students in a traditional setting.
- Survey data collected during the study indicate that 100 percent of educators reported student improvement in learning science, including:



Math

- The research indicates that students who have taught math through the EIC method begin to view math skills as tools that they can use to quantify, analyze and recognize connections among natural and socio-economic systems, rather than seeing math as a set of abstract concepts.
- Survey data collected during the study indicate that 92 percent of educators reported student improvement in learning math skills.

For More Information Contact:

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http://www.seer.org

The full results report is available by contacting the State Education and Environment Roundtable at (858) 676-0273.

Note: The findings above are calculated, based on the number of responses received for each survey question. It is important to note that the sample size (100 percent) for each question varies, dependent upon the number of educators responding to that question. The average response rate for all questions was 149 responses.

What is EIC: Basic Concepts?

Environment as the Integrating Context for learning (EIC) uses natural and socio-cultural environments as the context for learning while taking into account the "best practices" of successful educators. It combines these approaches in a way that:

- beaks down traditional boundaries between disciplines;
- provides hands-on learning experiences, often through problem-solving and project-based activities;
- relies on team-teaching;
- adapts to individual students, and their unique skills and abilities;
- assures both independent and collaborative learning opportunities;
- develops knowledge, understanding, and appreciation for the environment — community and natural surroundings; and,
- creates a synergy that helps educators establish a learning atmosphere that is academically effective and engaging for students as well as teachers.

EIC offers teachers a means of incorporating state and local content standards into an integrated-interdisciplinary curriculum. This process helps students simultaneously gain knowledge and skills in multiple subject areas. These programs are most effective when based on a developmentally appropriate scope and sequence.

EIC programs provide opportunities for students to explore varying viewpoints on issues that may face their local community or region. Students in these programs should learn how to accurately gather and evaluate information, from a variety of sources, before forming their own views and opinions about these issues. It is vital to the process of developing their critical-thinking skills that students are exposed to a diversity of information and opinions in a manner that avoids promoting the personal values or individual biases of educators and other community members.

Program Evaluation Rubric Items
Using the Environment as an Integrating Context for Instruction and Learning

In programs with a predominance of EIC, teachers use their school site, natural surroundings and community as a framework within which they organize learning. They utilize readily accessible natural and community settings as a comprehensive focus for learning in all areas: general and disciplinary knowledge; thinking and problem-solving skills; basic life skills, such as cooperation and interpersonal communications; and, last but not least, understanding of and appreciation for the environment.

Education based on EIC approaches can be implemented across all geographic and socio-economic settings. Since the ecosystems surrounding schools and their communities vary as dramatically as the nation's landscape, the term "environment" means different things at every school; it may be a river, a forest, a city park, or a garden carved out of an asphalt playground. In creating an EIC curriculum, educators have the opportunity to define the local environment broadly, to encompass natural ecosystems, and the socio-cultural systems in their community. Each school, by necessity, therefore designs its own program independently to take into account their specific locale, resources, and student needs.

Basing the instructional program on the local environment provides students with learning experiences that are relevant and meaningful in the context of their daily lives. Using this approach, educators are able to:

- capitalize on learning opportunities in their immediate area, ranging from the school site, neighborhood or park to their larger geographical region;
- design integrated-interdisciplinary programs that weave together the natural environment, and social and economic systems, within the cultural context of their school and community;
- connect the discipline-based knowledge and skills represented in state and local content standards into an integrated learning program;
- focus student learning on understanding natural and socio-cultural systems, their components, interrelationships and interactions with other systems; and,
- actively engage a wide variety of community members in providing learning experiences such as mentoring, internships and service learning opportunities.

Integrated-Interdisciplinary Instruction and Learning

In programs with a predominance of EIC, teams of teachers representing several subject areas organize instruction so students learn how knowledge and skills from a variety of disciplines can be interconnected to generate comprehensive understanding of natural and socio-cultural systems.

Integrated-interdisciplinary approaches afford students authentic opportunities to function as people do in the world outside the classroom. Using this approach, in the context of their natural and community settings, educators are able to:

- structure learning so that it helps students develop a comprehensive understanding that connects, rather than divides, the knowledge and skills provided by the traditional subject matter disciplines;
- develop curricula that provide EIC-based learning opportunities for essential academic content (language arts, mathematics, science, social studies, environment and ecology, etc.) and higher-level thinking skills;
- articulate learning experiences sequentially so they develop the knowledge and skills that can only be gained by exploring the interplay among natural, social and cultural systems;
- coordinate learning opportunities so that students simultaneously work on interrelated aspects of the same essential questions or themes in several subject areas and class periods; and,
- measures comprehensive understanding of their natural and community systems in addition to discipline-related knowledge and skills.

Collaborative Instruction and Learning

In programs with a predominance of EIC, educators work to create an extended learning community and establish broad-based instructional teams. Teachers on these teams typically represent the core disciplines (language arts, math, social studies, and science) as well as specialists from creative arts, computer literacy, etc.

EIC teams extend the learning community to incorporate parents, administrators and specialists from local businesses, government agencies, and centers, zoos and universities. This approach creates an atmosphere that helps students understand that they are members of a larger community.

Collaborative instruction also offers students the opportunity to gain insights from a variety of educators and community members, thus helping them discover the diversity of viewpoints that are represented within their community. Using this approach, in the context of their natural and community settings, educators are able to:

- develop a shared vision of the EIC instructional philosophy so they can cooperate to design curriculum, instructional strategic, and student assessment plans based on state and local content standards;
- provide their specialized skills in support of other team members so they all master the knowledge needed to facilitate learning in any aspect of their EIC program;

It is more important to pave the way for the child to want to know than to put him on a diet of facts he is not ready to assimilate.

—Rachel Carson

- meet daily to evaluate students' progress and adjust team plans accordingly, resolve logistical issues, and make other team decisions;
- exercise flexibility in changing schedules to take into account the needs and interests of their students' and colleagues';
- model sharing the workload, assigning team responsibilities and challenging each others' ideas through constructive dialogue;
- insure that there are ongoing professional development opportunities for all team members that include team building, program evaluation, authentic assessment, and learning experiences in their natural and community setting; and,
- incorporate parents, administrators, and specialists from local businesses, government agencies, nature centers, zoos and universities into the EIC teaching team.

Problem- and Issue-based Instruction and Learning

In programs with a predominance of EIC, teachers emphasize problem- and issue-based instructional approaches as a means of providing students with rich, authentic earning experiences that develop higher-level thinking skills. EIC educators guide students as they undertake projects that are designed to resolve authentic problems or investigate complex local issues.

Problem and issue-based instruction provides students the chance to combine their knowledge and skills in new and challenging ways. These real-world experiences help students perceive their education as meaningful and important, challenging them to think creatively and encouraging them to stay on task. Using this approach, in the context of their natural and community settings:

Educators support students as they work together to:

- identify, compare, select and pursue authentic, real-world problems, issues and projects in their community;
- develop goals, objectives, and design plans for studying their problem or issue;
- use the results of their studies to design, undertake and monitor service learning activities that encourage a sense of stewardship and make a meaningful contribution to their school or community; and,
- communicate their findings and/or accomplishments through reports, presentations or publications to the learning community and other appropriate audience.

Educators assure that students:

- devise developmentally appropriate plans, define achievable objectives and have a reasonable expectation to produce measurable results;
- acquire the skills and knowledge needed to successfully complete their projects;
- emplove higher-level thinking skills to devise creative solutions to problems and achieve multi-dimensional understanding of issues;
- are evaluated using authentic and performance-based assessment, have regular teacher feedback, and include self-evaluation in all phases of their problem- and issue-based studies; and,
- receive recognition for both individual accomplishments and team efforts.

Learner-centered, Constructivist Approaches

In programs with a predominance of EIC, teachers emphasize learner-centered, constructivist approaches and pay close attention to students' academic abilities and learning styles. With a standards-based framework, established by their teachers, this process allows students to actively participate in choosing the content and methods of their studies.

Learner-centered, constructivist methods provide students with a course of study that helps build their own individual understanding of new concepts and is adapted to their personal needs and interests. Using this approach, in the content of their natural and community settings, educators are able to:

- guide students as they select their course of study within the framework of knowledge and skills established by local and state standards;
- define specific learning goals and objectives for their program of study, design learning strategies and self-evaluation methods to meet agreed upon goals;
- create a learning environment that encourages students to compare and contrast newly acquired information with prior conceptions and allows them to synthesize and construct their own understandings and perspectives;
- provide opportunities to work on authentic problems, issues and projects that students identify and are interested in undertaking; and,
- assure sufficient independent study time so students can pursue their own authentic problems, issues and projects.

Educational Structure and Academic Environment

Schools implementing EIC need support from many facets of the educational system. Ultimately, these programs can only succeed in a setting where there is extensive cooperation among teachers, administrators, school-site staff, district personnel and community members.

EIC programs allow teachers to use the environment as a context within which they can combine a variety of "best practices" including: integrated-interdisciplinary instruction; collaborative learning opportunities; problem- and issue-based instruction; and, learner-centered, constructivist approaches. The synergy created by combining these effective teaching methods, in the context of their local natural and community setting, helps educators establish a creative, vibrant learning atmosphere.

Strong leadership and administrative support is crucial to the implementation and long-term success of EIC. Teachers in these programs depend on administrators to provide leadership that: encourages best educational practices, allows sufficient time for curricular planning, adjusts schedules to meet changing program needs and supports use of authentic assessment practices.

In programs with a predominance of EIC, educators can:

- combine the best practices, that define successful EIC programs, into a comprehensive, school-wide educational system that is articulated across the grades;

Think about it for a moment. A nation growing via its production of garden tools, technology for recycling, devices for cleaning the oceans, and development of alternatives for nonrenewable resources is not the same as a nation fostering economic growth through the production and marketing of automobiles that can travel at speeds far exceeding posted speed limits, and of superfluous trinkets in general.

—Robert J. Waller

- build team planning time into the school' schedule and give it a high priority sô that it is not replaced by other duties.
- depend on others to make adjustments in the school's schedule to support the EIC program:
- mix authentic and traditional assessment methods to accurately evaluate student progress:
- be assured of school and district resources (funds, transport, etc.) to provide for learning opportunities away from the school site;
- expect school building maintenance, renovation and new construction to facilitate EIC instruction and, at the same time, exemplify resource-efficient building design and operation;
- count on the active participation of parents and other members of the school team in the program; and,
- rely on the community to provide students with mentors and opportunities for internships, service learning and active participation in local planning and decision-making.

Fitting Into the Big Picture

With the variety of environmental education options available, two ways of fitting into the big picture are explained in this chapter: the Iowa Concept Chart and Pennsylvania Grade Level Concepts.

Iowa Concept Chart: Comparing Three Programs

Most environmental education programs, while different in focus, purpose and activities, tend to have some commonalities. This section shows some of these major conceptual themes and how they relate to concepts in preceding chapters. This mapping, rather than contrasting various curricula, builds on the strength of similarities, and in so doing, provides a conceptual framework for designing more specific local curriculum.

This section provides an overview of three major environmental education programs. Several key terms were organized around the three goals in this guide: knowledge, appreciation, and action. The key terms selected from the indicators include: change, cultural intervention, diversity, interrelationships, and sustainability.

The matrix on page 38-44 shows the interrelationships among three national programs, including Project WILD/Aquatic WILD, Project Learning Tree (PLT), and Food, Land & People (FLP). This conceptual framework provides the foundation for planners to design a program around key concepts of any environmental education program.

These concepts were selected because of importance, commonality across the representative curricula, and frequency. They do not represent all possible concepts, and educators may choose to expand on this framework.

Legend (used in the following charts)

F	***Food, Land & People***
P	***Project Learning Tree***
W	***Project WILD/Aquatic WILD***

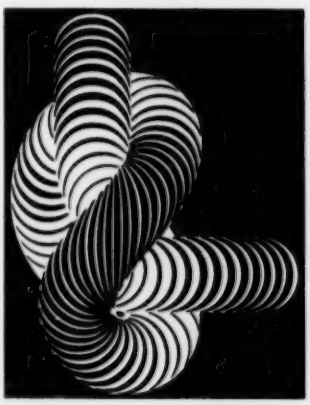
Pennsylvania Grade Level Standards for Environment and Ecology

The Pennsylvania Department of Education staff developed a self-assessment for grades four, seven, ten, and twelve. The assessment serves as a self-assessment tool for Iowa educators to determine if their programs achieve the desired results outlined in the survey. It may serve as a self-improvement tool to determine if concepts and benchmarks are being included within a grade level range to achieve the desired results. The Pennsylvania assessment is well suited to Iowa's needs and begins on page 45.

Chapter 4

The person who makes no mistakes lacks boldness and the spirit of adventure. He/she never tries anything new. He/she is a brake on the wheels of progress.

—M.W. Larmour



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If you understand, things are just as they are;
If you do not understand, things are just as they are.

— Zen Verse

LEGEND
F = Food, Land and People
P = Project Learning Tree
W = Project WILD/Aquatic WILD

IOWA FRAMEWORK: A Comparison of Three Programs

	Knowledge	Appreciation	Action
ADAPTATION	People use plants and animals in a wide variety of ways to obtain food, fiber, shelter and other products. **(F)** Populations of organisms exhibit variations in size and structure as a result of their adaptation to their habitats. **(P)** Humans and wildlife have similar basic needs. **(W)** Each environment has characteristic life forms. **(W)** Adaptation is continuous within all ecological systems. **(W)** Each area of land or water, and ultimately the planet, has a carrying capacity of plants and animals. **(W)**	Agricultural production systems vary according to geography, environment and traditions. **(F)** Humans have far greater ability to alter or adjust to environments than does wildlife; thus, humans have a responsibility to consider the effects of their activities on other life forms. **(W)**	
CHANGE	A local ecosystem changes with time, thereby impacting upon life within the system. **(F)** Change in agricultural systems are made in response to social, economic and environmental conditions. **(F)** Structure and systems change over various periods of time. **(P)** Organisms change throughout their lifetimes. Species of organisms change over long periods of time. **(P)**	Increased public knowledge of the environment and the need for conservation of natural resources have resulted in lifestyle changes in many cultures. **(P)**	

LEGEND
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W = Project WILD/Aquatic WILD

IOWA FRAMEWORK: A Comparison of Three Programs

	Knowledge	Appreciation	Action
CHANGE (*CONT.*)	As organisms go through their life cycle of growth, maturity, decline, and death, their role in the ecosystem also changes. **(P)** Ecosystems change over time through patterns of growth and succession. They are also affected by other phenomena such as disease, insects, fire, weather, and human intervention. **(P)** Variation and change occurs in all ecological systems. **(W)**		
CULTURAL INTERVENTION	Humans have the ability to alter ecosystems for their own purposes. **(F)** Throughout history, society has been dependent upon agriculture. **(F)** Agriculture has given rise to civilization. **(F)** Accelerating growth of the human population has been a significant environmental issue on planet earth. **(F)** Agricultural development has been influenced by political, social, cultural, and technical factors. **(F)**	People's images, attitudes and behaviors create the issues and trends affecting agriculture and the environment. **(F)** Cultural and societal perspectives influence the attitudes, beliefs, and biases of people toward the use of resources and environmental production. **(P)** Leisure and recreational pursuits can have an impact on forests and other resource-producing areas. **(P)** Wildlife has aesthetic and spiritual values. **(W)** Wildlife has ecological and scientific values. **(W)**	People's behavior is stressing the planet. **(F)** Human attitudes and behavior impact ecosystems. **(F)** People as individuals, and as members of society, make choices and decisions which affect the environment. **(F)** By reducing waste and recycling; materials, individuals and societies can extend the value and utility of resources and also promote environmental quality. **(P)** Conservation technology enables humans to maintain and extend the productivity of vital resources. **(P)**

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LEGEND
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IOWA FRAMEWORK: A Comparison of Three Programs

	Knowledge	Appreciation	Action
CULTURAL INTERVENTION (*CONT.*)	The production to consumption of agricultural products has many key steps and varies from society to society. **(F)**	Wildlife has social and political values. **(W)**	Effective citizen involvement in the environmental decision-making process involves a careful study of all sides of the issues, along with the ability to differentiate between honest, factually accurate information and propaganda. **(P)**
	Wildlife conservation practices depend on a knowledge of natural laws and the application of knowledge from many disciplines. **(W)**	Wildlife has commercial and economic values. **(W)**	Wildlife resources can be managed and conserved. **(W)**
	Human impacts on wildlife and its habitat are increasing worldwide. **(W)**	Wildlife has intrinsic value, although humans often only recognize values based upon human wants and needs. **(W)**	Societies develop programs and policies relating to wildlife and its habitat through a variety of social mechanisms. **(W)**
		In the United States, wildlife is considered to be a public resource. Ownership of land or water alone does not secure ownership of wildlife on that land or in the water as it does in some other countries. **(W)**	Current wildlife issues and trends are complex and involve alternatives and consequence. **(W)**
		Human cultures and societies, past and present, affect and are affected by wildlife and its habitat. **(W)**	Responsible environmental actions are the obligation of all levels of society, starting with the individual. **(W)**
		Issues involving wildlife and its habitat are a product of social and cultural trends. **(W)**	
		Many problems, issues and trends involving wildlife in other parts of the world are similar to those in this country. **(W)**	
		Each person, as an individual, and as a member of society, affects the environment. **(W)**	

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LEGEND
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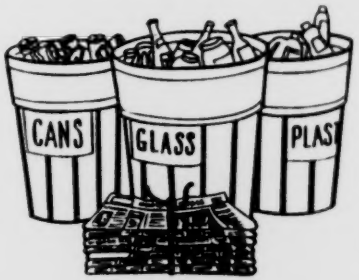
P = Project Learning Tree
W = Project WILD/Aquatic WILD

IOWA FRAMEWORK: A Comparison of Three Programs

	Knowledge	Appreciation	Action
DIVERSITY	Earth contains many ecosystems which are supported by four basic resources. **(P)**	Humans throughout the world create differing social, cultural, and economic systems and organizations to help them meet their physical and spiritual needs. **(P)**	
	Throughout the world, there is a great diversity of habitats, organisms, societies, technologies, and cultures. **(P)**	The standard of living of various peoples throughout the world is dependent on environmental quality; the availability, utilization and distribution of resources; the government; the culture of its inhabitants. **(P)**	
	Biological diversity results from the interaction of living and nonliving environmental components such as air, water, climate, and geologic features. **(P)**	Natural beauty, as experienced in forests and other habitats, enhances the quality of human life by providing artistic and spiritual inspiration, as well as recreational and intellectual opportunities. **(P)**	
	Ecosystems contain numerous habitats that support diverse populations of organisms. **(P)**		
	The Earth's atmosphere, water, soil, climate, and geology vary from region-to-region, thus creating a wide diversity of biological communities. **(P)**		
	Living things tend to reproduce in numbers greater than their habitat can support. **(W)**		
INTER-RELATIONSHIPS	The nature of the interaction between food, land and people determines the quality of life. **(F)**	Human decisions are sometimes negated by nature. **(F)**	Altering the environment affects all life forms, including humans, and the interrelationships that link them. **(P)**
	Within an ecosystem, all living things are interdependent and interrelated. **(F)**	The interdependence of food, land and people occurs in all societies. **(F)**	Pollutants are harmful by-products of human and natural systems which can enter the ecosystems in various ways. **(P)**

Everyone has a listening-point somewhere. It does not have to be in the north or close to the wilderness, but some place of quiet where the universe can be contemplated with awe.

—Sigurd Olson



LEGEND
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IOWA FRAMEWORK: A Comparison of Three Programs

	Knowledge	Appreciation	Action
INTER-RELATIONSHIPS (CONT.)	The ecological, technological, and socio-cultural systems are interactive and interdependent. **(P)** Organisms are interdependent, and depend on nonliving components of the Earth. **(P)** Human societies and cultures throughout the world, interact with each other and affect natural systems upon which they depend. **(P)** Environmental, technological, and social systems are interconnected and interacting. **(P)** In biological systems, energy flows and materials continually cycle in predictable and measurable patterns. **(P)** The structure and scale of an ecosystem are influenced by factors such as soil type, climate, availability of water, and human activities. **(P)** The planet has a finite supply of natural resources. **(F)** Humans and wildlife share environments. **(W)** Living things tend to reproduce in numbers greater than their habitat can support. **(W)**	The continued existence of human society is dependent upon the harmonious interaction of food, land and people through international cooperation. **(F)**	

LEGEND
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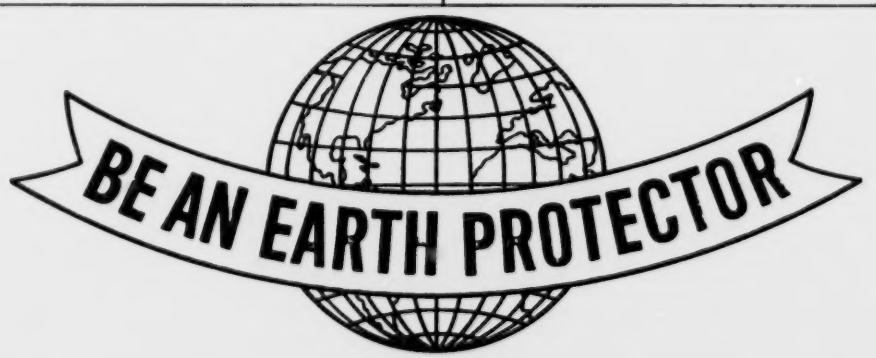
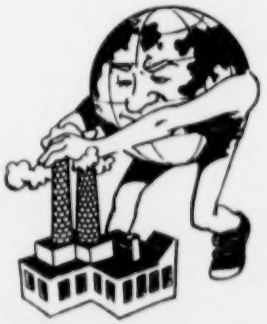
IOWA FRAMEWORK: A Comparison of Three Programs

	Knowledge	Appreciation	Action
SUSTAINABILITY	Accelerating growth of the human population has been a significant environmental issue on planet Earth. (F) Many and varied plants and animals are fundamental to agriculture. (F) If people are to maintain a food supply, then air quality, usable water supplies and productive soils are global necessities. (F) Humans have far greater ability to alter or adjust to environments than does wildlife; thus, humans have a responsibility to consider effects of their activities on other life forms. (W)	Agricultural production influences the economies of local and global communities. (F) Wildlife is one of our basic natural resources, along with water, air, minerals, soil and plant life. (W) Good habitat is the key to wildlife survival. (W)	Survival is dependent upon how well people manage natural resources. (F) Wise management and group conservation practices improve plant and animal yields by protecting soil, water and air. (F) Responsible human decisions are necessary to maintain food and natural resources. (F) People and governments have a responsibility to maintain the stability of society, which extends to agricultural productivity and environmental protection. (F) The future of human existence is dependent upon international cooperation to resolve global problems. (F) Conservation and management technologies, when appropriately applied to the use or preservation of natural resources, can enhance and extend the usefulness of the resource as well as the quality of the environment. (P) Demographics influence environmental quality, government policy, and resource use. (P) Many items can be recycled. (P) We have everyday choices regarding the environment and our use of resources. (P)





IOWA FRAMEWORK: A Comparison of Three Programs

LEGEND
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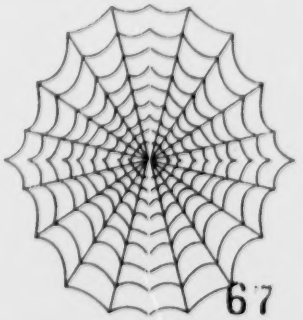
	Knowledge	Appreciation	Action
SUSTAINABILITY (CONT.)			We need to be aware of what we are purchasing and the impact of our purchases (hidden costs) upon the environment. **(P)** It will take cooperation from all sectors of society to help us accomplish our goal of sustainable life on this planet. **(P)** Management of resources and environments is the application of scientific knowledge and technical skills to protect, preserve, conserve, limit, enhance or extend the value of a natural resource, as well as to improve environmental quality. **(W)**

Iowa's Adoption of Pennsylvania Academic Standards for Environment and Ecology

To what extent are the following concepts taught to your students in or by Grade 4?	Ratings		
Concepts	**Concept not Taught**	**Concept Introduced but not Completely Covered**	**Concept Taught**
1. Identifying and explaining the physical parts of a watershed and how water enters it.	_____	_____	_____
2. Identifying different kinds of water environments (including wetlands), the living things found in these environments and the habitat value to plants and animals.	_____	_____	_____
3. The role watersheds and wetlands play in people's everyday life.	_____	_____	_____
4. Plants, animals, water, air, minerals, and fossil fuels are natural resources that humans need.	_____	_____	_____
5. Identifying different products made from natural resources.	_____	_____	_____
6. Natural resources are limited, and identifying ways of conserving them.	_____	_____	_____
7. Identifying different disposal methods for "trash" (example: recycling, reuse, not purchasing unnecessary items, composting, landfill, and incineration).	_____	_____	_____
8. Identifying personal actions that can prevent or reduce waste and pollution.	_____	_____	_____
9. Identifying ways our health can be affected by air, water, or land pollution both in and outside our homes.	_____	_____	_____
10. Discussing how point and non-point source pollution and litter affect environmental health.	_____	_____	_____
11. The importance of a healthy ecosystem.	_____	_____	_____
12. The importance of agriculture to supplying human's basic needs.	_____	_____	_____
13. Identifying plants and animals from which food and fiber originate in different geographic regions.	_____	_____	_____
14. Identifying tools and sources of energy associated with food and fiber production.	_____	_____	_____

Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web; he does to himself.

—Chief Seattle



Iowa's Adoption of Pennsylvania Academic Standards for Environment and Ecology

To what extent are the following concepts taught to your students in or by Grade 4?

Concepts	Ratings: Concept not Taught	Concept Introduced but not Completely Covered	Concept Taught
15. Identifying local agricultural careers and businesses.			
16. Identifying living and non-living components to an ecosystem and the interactions among those components to meet the living components' food and shelter needs.			
17. The concept of cycles (example: water, human life cycle)			
18. Identifying changes that occur in an ecosystem, through time, which are both natural and human induced.			
19. Identifying different types of pests, pest controls, and integrated pest management practices inside and outside of the home.			
20. Identifying differences in living things (colors, shapes, sizes) and how these differences help or hinder survival (camouflage, warning colors).			
21. Identifying essential elements of a habitat for the organisms that live in that habitat.			
22. Defining extinction and giving examples of extinct plants and animals and explaining why they went extinct.			
23. There are local and state laws to protect plants and animals.			
24. Identifying regional environmental effects related to natural resources and used by students (example: coal, wood).			
25. Identifying how everyday human activities effect the environment and in particular, the students' local area over the years.			
26. Identifying major land uses in the students' community.			
27. Identifying who sets rules at school and in the community, what factors influence these rules, and what happens when individuals break the rules/laws.			
28. Identifying local and state rules that are important for protecting the environment and whose job it is to enforce these laws.			

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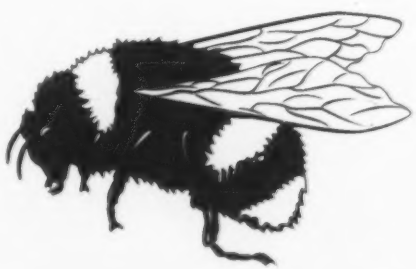
Iowa's Adoption of Pennsylvania Academic Standards for Environment and Ecology

To what extent are the following concepts taught to your students in or by Grade 7?	Ratings		
Concepts	**Concept not Taught**	**Concept Introduced but not Completely Covered**	**Concept Taught**
1. Identifying and explaining the components of a watershed and how water flows through it.	_____	_____	_____
2. The role of the water cycle in a watershed.	_____	_____	_____
3. The life cycle of organism in a watershed and how the physical components of aquatic systems influence organisms.	_____	_____	_____
4. Characteristics of wetlands including plants, animals, and soils, and how wetlands benefit the environment.	_____	_____	_____
5. The importance of wetlands and watershed for people (example: provide flood control)	_____	_____	_____
6. Identifying the natural resources which provide the raw materials used in clothing, shelter, and food.	_____	_____	_____
7. Identifying renewable and non-renewable resources and their uses.	_____	_____	_____
8. Comparing natural resource distribution worldwide and the impact of various management practices in forestry, agriculture, fisheries, wildlife, and mining have on air, land, and water.	_____	_____	_____
9. The role of recycling in waste management.	_____	_____	_____
10. Identifying pollutants and their causes and effects on human health and the health of other species and ecosystems.	_____	_____	_____
11. The impact land use practices and residential and industrial pollution have on the health of the environment.	_____	_____	_____
12. The benefit of biological diversity for healthy ecosystems.	_____	_____	_____
13. Comparing human needs to the needs of plants and animals as they relate to agricultural practices through time.	_____	_____	_____
14. Different agricultural occupations throughout history.	_____	_____	_____
15. How agriculture uses natural resources.	_____	_____	_____

Of what avail is an open eye, if the heart is blind?

— Solomon Ibn-Gabirol



Iowa's Adoption of Pennsylvania Academic Standards for Environment and Ecology

To what extent are the following concepts taught to your students in or by Grade 7?

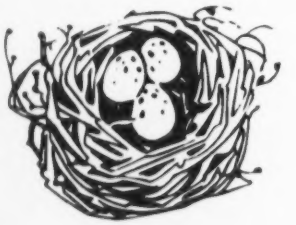
	Concepts	Ratings: Concept not Taught	Concept Introduced but not Completely Covered	Concept Taught
16.	Comparing various technologies that have advanced agricultural production.			
17.	Identifying the functions of various organisms within an ecosystem and how those organisms are interdependent with each other and the non-living components of an ecosystem.			
18.	Explanation of cycles (example: carbon dioxide cycle, water cycle).			
19.	Explanation of the change (natural and human induced) which take place over time in ecosystems (example: succession).			
20.	Beneficial and harmful effects of pests in different locations.			
21.	How pest management impacts the environment and how integrated pest management has been influenced by policies and technology over time.			
22.	Various pest management practices used in different communities and the long-term effects of these practices.			
23.	Identifying plants and animals in a selected ecosystem and the adaptations they have which help them survive.			
24.	How natural selection takes place and what happens to a species when there are changes in the environment.			
25.	The difference between threatened, endangered, and extinct species and causes for fluctuations and declines in populations.			
26.	Identifying natural events and human behaviors that cause habitat loss.			
27.	State laws which protect threatened and endangered species in Pennsylvania (Iowa).			
28.	How natural resources and technological changes have affected the development of civilization.			
29.	How conservation practices influence ecosystems and who in Pennsylvania (Iowa) helps communities design land management plans.			
30.	Identifying environmental laws and regulations, their importance, and the consequences for breaking the laws.			
31.	Factors that influence environmental decisions, laws and regulations.			

Iowa's Adoption of Pennsylvania Academic Standards for Environment and Ecology

To what extent are the following concepts taught to your students in or by Grade 10?	Ratings		
Concepts	**Concept not Taught**	**Concept Introduced but not Completely Covered**	**Concept Taught**
1. Changes that occur in a stream from point of origin to final destination.	_____	_____	_____
2. The relationship between land forms, vegetation, and amount and speed of water.	_____	_____	_____
3. Identifying the physical components of a stream and the types of organisms found in an aquatic environment.	_____	_____	_____
4. Importance of wetlands for habitat, flood prevention, buffer zones, nurseries, food production, and pollution filters.	_____	_____	_____
5. Explanation of how natural events and human activities effect a watershed.	_____	_____	_____
6. Identifying different management alternatives involved in recycling and solid waste management.	_____	_____	_____
7. Examining various factors affecting natural resources and their availability (example: consumer decisions, consumption, conservation, use of alternative energy sources, advertising, extraction technologies, and natural events.	_____	_____	_____
8. Identifying different management alternatives involved in recycling and solid waste management.	_____	_____	_____
9. Identifying the human health effects of air, water, and soil pollution.	_____	_____	_____
10. Identifying multiple variables which determine the effects of pollution on environmental health (example: land management practices, natural disasters, waste treatment).	_____	_____	_____
11. Explanation of how biological diversity indicates a healthy ecosystem.	_____	_____	_____
12. Comparing the influence of agriculture on a nation's culture, standard of living, and foreign trade.	_____	_____	_____
13. Identifying a commodity, its origin, steps in production and cost of production.	_____	_____	_____
14. Comparing various technological advances for their contribution toward labor and cost efficiency in agriculture.	_____	_____	_____
15. Identifying various agricultural careers.	_____	_____	_____

Even the seasons form a great circle in their changing, and always come back again to where they were. The life of a man is a circle from childhood to childhood and so it is in everything where power moves.

— Black Elk



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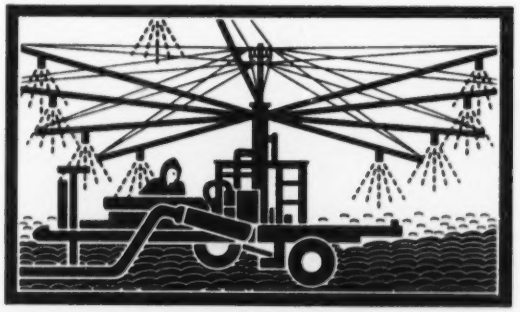


Iowa's Adoption of Pennsylvania Academic Standards for Environment and Ecology

To what extent are the following concepts taught to your students in or by Grade 10?

Concepts	Ratings: Concept not Taught	Concept Introduced but not Completely Covered	Concept Taught
16. Identifying and explaining biotic and abiotic components of an ecosystem and their interactions (example: how populations fluctuate in numbers, energy pyramid, homeostasis).	____	____	____
17. Identifying how cycles impact the sustainability of an ecosystem.	____	____	____
18. How ecosystems and their components change over time from natural and human causes.	____	____	____
19. Identifying species which are pests in some areas of the world and are not pests in other areas.	____	____	____
20. Identifying the health risks and benefits associated with pest control.	____	____	____
21. The impact of integrated pest management on society and how that impact changes over time.	____	____	____
22. How structure, function, and behavior of plants and animals affect their ability to adapt and survive.	____	____	____
23. Identifying threatened, endangered and extinct species and the natural and human factors which lead to species decline.	____	____	____
24. The national strategy to protect threatened and endangered species and the impact of the Endangered Species Act.	____	____	____
25. Comparing the use of natural resources and environmental conditions in several countries and the effects on the global ecosystem.	____	____	____
26. Analysis of how all human activities cause change in our environment that impact the biosphere and its resources.	____	____	____
27. The environmental consequences of the law of supply and demand (example: environmental conditions as a result of increased human population).	____	____	____
28. Identifying the major national environmental laws, how they protect the environment, and their impact at the local and state levels.	____	____	____
29. How environmental laws and regulations are designed and enacted by lawmakers.	____	____	____

Iowa's Adoption of Pennsylvania Academic Standards for Environment and Ecology

To what extent are the following concepts taught to your students in or by Grade 12?	Ratings		
Concepts	**Concept not Taught**	**Concept Introduced but not Completely Covered**	**Concept Taught**
1. Identifying the order of water courses within a watershed associated with a major river.	_____	_____	_____
2. Identifying the specific physical factor that define a watershed.	_____	_____	_____
3. Assessing the quality of a watershed through physical, chemical, and biological data.	_____	_____	_____
4. Identifying different types of wetlands and their function of providing habitat, producing nutrients, providing migration stopover sites, and recharging groundwater.	_____	_____	_____
5. Identifying the impact of human activities and natural phenomenon on watersheds and wetlands.	_____	_____	_____
6. Identifying the environmental impacts of using renewable and non-renewable natural resources.	_____	_____	_____
7. Identifying factors that affect the availability of renewable and non-renewable resources.	_____	_____	_____
8. The role that socio-economic and political factors play in the management and distribution of natural resources.	_____	_____	_____
9. Recycling and solid waste management practices (example: interstate transport of trash).	_____	_____	_____
10. Identifying environmental health issues and analyzing how they have been addressed world-wide by various organizations (example: through legislation, through pollution controls, through programs).	_____	_____	_____
11. The economic cost of environmental pollution and natural disasters.	_____	_____	_____
12. Costs and benefits of by-products of agricultural crops that are used in medicine, cosmetics, cleaning products, and industrial research.	_____	_____	_____
13. Identifying different types of agricultural research and development activities.	_____	_____	_____
14. Career profiles for professionals and technical profession in agriculture.	_____	_____	_____
15. Examining an ecosystem and explaining the relationships between a variety of its components (example: how and why populations fluctuate, energy flow through an ecosystem).	_____	_____	_____

Teach your children what we have taught our childen — that the earth is our mother. Whatever befalls the earth, befalls the sons of the earth. If men spit upon the ground, they spit upon themselves.

— Chief Seattle

Iowa's Adoption of Pennsylvania Academic Standards for Environment and Ecology

To what extent are the following concepts taught to your students in or by Grade 12?

	Concepts	Ratings: Concept not Taught	Concept Introduced but not Completely Covered	Concept Taught
16.	Identifying sources of minerals in natural cycles.			
17.	Identifying local, state, national, and global factors which affect water quality.			
18.	Analyzing how humans' actions and natural events affect the balance within an ecosystem.			
19.	Identifying threshold limits of pests and the need for intervention in a managed environment.			
20.	The relationship between integrated pest management and political and economic processes.			
21.	The historical significance of integrated pest management on society.			
22.	Biodiversity as an indicator of a stable ecosystem.			
23.	Explaining how extinction of species occurs as a result of natural processes and human activities.			
24.	The effects of threatened, endangered, and extinct species on human and natural worlds.			
25.	Analyzing how individuals and societies consume natural resources to meet their needs and wants, and the effect this has on the sustainability of global ecosystems and resources.			
26.	Identifying how pollution has changed in quantity, variety, and toxicity as the U.S. has developed its industrial base.			
27.	Identity how human activities may result in climate change.			
28.	Identifying major environmental laws and regulations at local, state, national, and international levels, the steps in passing legislation, and who is responsible for implementing these laws.			
29.	Identifying the impact environmental laws and regulations have had on the quality of the environment.			
30.	How to make decisions regarding environmental problems.			

Appendices

Iowa Department of Education
Mission and Goals

Governor Conference Priorities

References

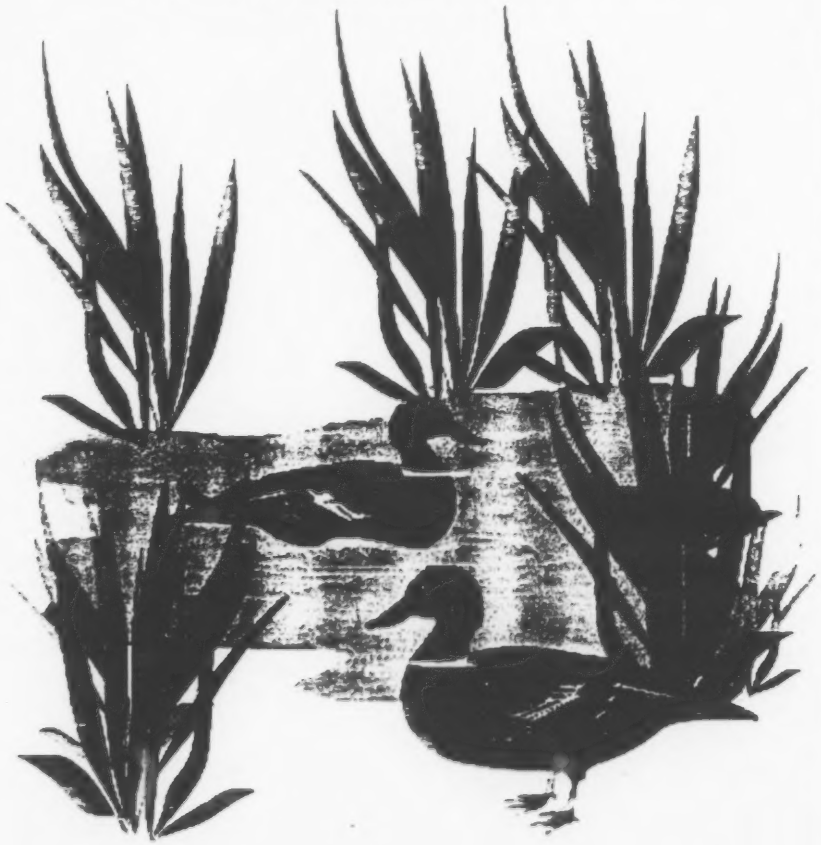
Iowa Resource Agencies and Organizations

Iowa Commodity Groups

Local Resource Groups

National Resource Agencies and Organizations

Environmental Education Glossary of Terms



Iowa Department of Education Mission Statement

Our mission is to champion excellence in education through superior leadership and service. We are committed to ensuring that all Iowans have access to a network of services that allows them to realize their potential. Through education, we strive to build a quality of life which sets the standard for the nation.

Appendix

Iowa Department of Education Education System Goal

To improve the level of learning, achievement and performance of all students so they will become successful members of their community and the workforce.

Support Goals

The State Board and the Department of Education have adopted three interrelated goals that support the education system goal.

Support Goal A: To help schools and their communities obtain the skills, competencies, and resources they need to meet the learning needs of all their children and adults.

Strategies:

- Support school improvement by assisting local communities with school/community planning, school improvement plan implementation and evaluation of progress toward attaining locally established student achievement goals.
- Support the improvement of teaching and instructional practices at the classroom level so that the achievement of all students continuously improves.
- Strengthen the role that education plays in developing a quality workforce.
- Support quality educator preparation and professional development programs designed to give educators the skills they need to improve teaching and learning.
- Help with the continuous improvement of the basic operations of school districts and community colleges.

Support Goal B: To coordinate the educational support system so it is focused on helping schools and communities meet their local goals.

Strategies

- Develop a partnership and common direction with the state's 15 area education agencies.
- Align state and federal programs and funding sources so that they can be used to support local school improvement efforts.
- Advocate for strong community partnerships and linkages among schools, parents, community members, business and other institutions.

Support Goal C: To provide collaborative state level leadership and support for Iowa education in order to create system-wide improvement and increased student achievement.

Strategies:

- Communicate the needs of the education system and develop the information systems needed for quality planning, policy development, decision making, and accountability.
- Advocate for adequate and equitable funding for education.
- Implementation procedures to ensure accountability, while allowing for maximum local flexibility.

Governor's Environmental Education Conference: Priorities for the 90's and the 21st Century

The conference was sponsored by the Iowa Department of Education January 12-13, 1990. The 88 participants of this conference came from a broad cross-section of the Iowa populace representing citizens, organizations, and agencies concerned with the environmental education of the Iowa public. Not all agreed with the final ranking of priorities, for that is the nature of the democratic process. To a person, however they participated fully in the process, contributing willingly, openly, and with intelligence and vigor. The priorities will be useful well into the twenty-first century.

Priorities in Ranked Order:

Life-styles and Decision-Making

Iowans should implement and integrate environmental education into their life-styles and decision-making. This should include the education of individual consumers on specific buying choices at the point of purchase. Also, we must pursue the education of retail managers, product manufacturers, and major users of environmentally damaging or recyclable products.

Adult and Community Education

In order to facilitate responsible community and individual action toward the environment, we must educate adults within existing educational and community structures through the mass media, through organized settings where adults gather, and through newly created educational opportunities.

Professional Training and Teacher Licensure

In order for Iowa to create an environmentally educated populace to carry us into the 21st century, our leaders of schools, youth groups, and businesses must be aware of the environmental problems that Iowa will face and be able to instill in groups the necessary means to solve these problems. This should include integration of environmental education for pre-kindergarten through college, inservice in environmental education for all teachers and administrators, training for non-licensed professionals and educators in other educational fields, and incentives and recognition to help ensure this goal is accomplished.

Coordination and Cooperation

In order to make our shared efforts in environmental eduction more effective and efficient, a network or system to facilitate cooperation and coordination among Iowa organizations, agencies, institutions, business, industry, and labor should be formed. Goals for this environmental network should promote environmental education in their ranks; and coordinating the production and dissemination of environmental education resources, materials, and information.

Curriculum and Program Development

Curriculum and program development must allow for the development and revision of environmental education materials, their inservice, and evaluation. To facilitate development of programs, there needs to be networking, awareness of existing materials, communication between educators and organizations, development of new curricula in some areas, widely available environmental education resource personnel, and the development of research models to evaluate effectiveness.

Government, Business, Labor, and Industry

There is a need to educate government, business, labor, and industrial leaders and decision-makers about environmental/societal issues, problems, and opportunities. The hidden and deferred environmental costs which are transferred to society as a whole must be made known to all of these decision-makers. Methods and procedures to change business, labor, industry, and government processes to be more environmentally sound must be researched, identified, and promoted. Appropriate use of incentives, recognition, and pressure are techniques that may be applicable. Employee involvement within government, business, labor, and industry is a vital ingredient to success.

Incentives

In order to establish the practice of environmentally conscientious behavior, we must provide incentives, financial and otherwise, for individuals, businesses, industry, and labor. This should include cash award, tax incentives, and preferences for environmentally sound behavior, as well as consumer pricing that reflects environmental costs and community development grants for environmental projects.

Instituting Environmental Education into Formal Education

A comprehensive environmental education program should be created for formal and higher education. This program should include: a preservice program in environmental education to be required of all Pre K-12 teacher can-

Appendix

To laugh often and much; to win the respect of intelligent people and affection of children; to earn the appreciation of honest critics and endure the betrayal of false friends; to appreciate beauty, to find the best in others; to leave the world a bit better, whether by a healthy child, a garden patch or a redeemed social condition, to know even one life has breathed easier because you have lived. This is to have succeeded.

— Ralph Waldo Emerson

didates, a Pre K-12 cross-disciplinary curriculum, greater incorporation of environmental education into university academic offerings, and program offerings for public non-teacher educators.

Critical Issues

Before we can act to improve our environment, Iowans must understand the critical issues affecting the state. Educators should be trained on how to provide information on energy conservation, non-point pollution, air and water quality, toxics, waste management, soil conservation, wildlife habitats, species diversity, and population. This information will help people define environmental problems and decide how individuals and groups may best address these concerns.

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Iowa Agencies, Organizations and Institutions Resource Materials

Heartland Area Education Agency
Tim Graham tgraham@aea11.k12.ia.us
6500 Corporate Drive
Johnston, Iowa 50131 800-362-2720

for CD ROM Project N.E.W. (Nature, Environment, Water)

Agri-Education, Inc.
801 Shakespeare Avenue
Strattord, Iowa 50249

agri-ed@netins.net
CDROM Programs on:
water (CLEAR) - Grades 4-12
The Nitrogen Cycle - Grade 7
Soil and Water Conservation - Grades 7-12

Iowa Academy of Science
175 Baker Hall
University of Northern Iowa
Cedar Falls, Iowa 50614

Iowa Association of County Conservation Boards
405 SW 3rd Suite 1
Ankeny, Iowa 50021

Outdoor Adventure Guide, including maps of counties.

Iowa Association of Naturalist
2463 160th Road
Guthrie Center, Iowa 50115

See IAN Booklet series listed under Iowa State University listings.

Iowa Audubon
P.O. Box 71175
Des Moines, Iowa 50312

Iowa Bowhunters Association
216 Oak Street
Waverly, Iowa 50677

Iowa Conservation Education Council
ICEC PO Box 233
Boone, Iowa 50036

Multiple workshops and quarterly newsletter "Pathways to Education."

Iowa Department of Agriculture and Stewardship
Wallace State Office Building
Des Moines, Iowa 50319
1-515-281-5321

Iowa Department of Education
Environmental Education Consultant
Iowa Department of Education
Grimes State Office Building
Des Moines, Iowa 50319
515-281-3146

For the following information:
- Environmental Education Newsletter
- REAP Conservation Education Program Workshops:
  - Food, Land & People
  - Nature Speaks
  - Environmental Education Collage
  - Celebrating Connections

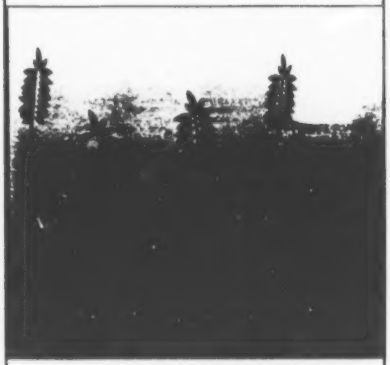
Iowa Department of Natural Resources
Conservation Education Center
2473 160th Road
Guthrie Center, Iowa 50115
515-747-8383

For the following information
- Project WILD/Aquatic WILD & Iowa WILD (elementary)
- Taking Action: An Educator's Guide to Involving Students in Environmental Action Projects
- Project Learning Tree (Pre K-8)
- Project Learning Tree Secondary Modules (7-12)
  - Introductory Handbook for the Secondary Modules
  - Focus on Forests (forest use and issues)
  - Forest Ecology
  - Municipal Solid Waste
  - Focus on Risk (social action)
- Fish Iowa (4-12)
- EnviroScape and Stream Table (demonstration models)
- Goin' With the flow... Involving Students in Hands-on Stream Improvement Projects
- Hooked on Fishing, Not on Drugs (K-12)
- IOWATER (volunteer water quality monitoring program)
- Our Watershed: Guide, Activities and Student Logbook (Springbrook visitor manual grades 5-6)
- Day use and residential facilities for youth groups, student groups, educators and adults including some materials and training.

Workshops
- Winter Solstice (third weekend in January)
- Envirothon
- American Wilderness Leadership School (AWLS)

Contact: Iowa DNR, Law Enforcement Bureau, Wallace State Office Building, Des Moines, Iowa 50319-0034, telephone 515-281-8652 for the following:
- Iowa Hunter Education Program (ages 12 and up)
- Iowa Snowmobile Safety Program (age 12 and up, classroom or home study)
- Iowa All Terrain Vehicle Safety Program (age 12 and up) call 1-800-2887 for classes)
- Learn Gun Safety with Eddie Eagle (Pre K-12)
- Iowa Bow Hunter Education Program (Age 12 and up)
- Iowa Boating Basics (age 12 and up, classroom or home study)
- Water Safety Education Resource Guide (K-12)
- Aquanauts Boating Safety Program (Age 12 and up)

Other programs available from the Des Moines central office of DNR or field offices located throughout the state include: Trees for Kids and Trees for Teens, geology booklet series, water (volunteer water quality monitoring program), energy, and waste management. Iowa Trumpeter Swan Restoration Program,



and Prairie Pothole Venture. Contact Information Education Chief, Iowa DNR Wallace State Office Building, Des Moines, Iowa 50319 (515) 281-5973

Iowa Department of Transportation
Office of Maintenance Services
800 Lincoln Way
Ames, Iowa 50010

Brochures on roadside management, adopt a highway and Iowa Trail System

Iowa Ducks Unlimited
204 S 11th Ave. W
Box 71
Lake Mills, Iowa 50450

(three addresses for Iowa)
222 Cedar St.
Boone, Iowa 50036

310 Long St.
Williamsburg,
Iowa 52361

Iowa Environmental Council
7031 Douglas Avenue
Des Moines, Iowa 50322
iccmail@earthweshare.org

Iowa Natural Heritage Foundation
Insurance Exchange Building
Suite 444
505 Fifth Avenue
Des Moines, Iowa 50309

For information on wetland restoration, community tree planting and care, trail development, water quality, and Resourceful Farmer program.

Iowa Ornithologists' Union
1928 6th St.
Nevada, Iowa 50201

Encourages interest in identification, study and protection of birds in Iowa and publishes quarterly Iowa Bird Life and IOU News.

Iowa Prairie Network
P.O. Box 516
Mason City, Iowa 50402-0516

Iowa Society of American Foresters
Forestry Division, IDNR
Wallace State Office Building
Des Moines, Iowa 50319

Iowa Sportsmen Federation
4123 Lawnview Drive
Des Moines, Iowa 50310

Iowa State University
Youth and 4-H Program
33 Curtis Hall
Iowa State University
Ames, Iowa 50011
515-294-4764

For the following information:
Project N.E.W.: environmental resources on nature, energy and water resources

(Update available: Summer 1999 (4-9) CD ROM and teacher activities to lead with students including student hand outs.
Available to order from Heartland AEA call 1-800-362-2720.
Teacher training available fall 1999. (Materials only available with training.)

Order the following from Extension Distribution Center.
Call (515)-294-5247
Guide to Environmental Education and Interpretive Services in Iowa in cooperation with IAN
Birds, Beasts, Bugs and Us. Activities for Environmental Education (K-12)
Mud, Muck and Other Wonderful Things: A K-3 set of activities on the environment.
Soils Alive! A 4-8 set of activities on soil.
Energy, Economics and the Environment: Activities for youth in grades 6-12
Iowa 4-H Center Field Schools program on the Environment. Call 1-515-795-3338
Outdoor field trips. Day and extended overnight using 1100 acres as your classroom.

Iowa State University Department of Agricultural Education and Studies
201 Curtis Hall
Iowa State University
Ames, Iowa 50011

For the following information:
SALA (Sustainable Agriculture Learning Activities (Secondary)
Groundwater Protection through Prevention (Secondary)
Offers software, curricula, video and hands-on materials primarily for high school students and
Agricultural awareness packets primarily for elementary and middle school students.

University Extension Service
218 Beardshear Hall
Iowa State University
Ames, Iowa 50011-2046

Information, brochures, and workshops on wildlife, fisheries, forestry, horticulture, agriculture, and home environment issues. Information available on day and overnight environmental education experiences. Offices located in every county.

Iowa Association of Naturalists (booklet series)
Extension Distribution Center
119 Printing and Publications Building
Iowa State University
Ames, Iowa 50011-3171
Voice 515-294-5247
Fax 515-294-2945
e-mail pubdist@exnet.iastate.edu

Available in public and school libraries in Iowa. Educators and librarians may order additional booklets at a cost of $1.00 per booklet by contacting the Extension Distribution Center.

Appendix

IAN Series as follows: .

IOWA'S NATURAL RESOURCE HERITAGE

Changing Land Uses and Values	(IAN-501)
Important Iowa Conservationists	(IAN-502)
Iowa' Environmental Laws	(IAN-503)

IOWA WILDLIFE AND PEOPLE

Iowa Wildlife Management	(IAN-401)
Keeping Iowa Wildlife Wild	(IAN-402)
Misconceptions About Iowa Wildlife	(IAN-403
State Symbols of Iowa	(IAN-404)
Iowa Food Webs and other Interrelationships	(IAN-405)
Natural Cycles in Iowa	(IAN-406)
Iowa Biodiversity	(IAN-407)
Adapting to Iowa	(IAN-408)

IOWA PLANTS

Iowa's Spring Wildflowers	(IAN-301)
Iowa's Summer and Fall Flowers	(IAN-302)
Benefits and Dangers of Iowa Plants	(IAN-303)
Iowa Trees	(IAN-304)
Seeds, Nuts, and Fruits of Iowa Plants	(IAN-305)
Iowa's Mushrooms and Other Nonflowering Plants	(IAN-306)
Iowa's Shrubs and Vines	(IAN-307)

IOWA'S BIOLOGICAL COMMUNITIES

Iowa Biological Communities	(IAN-201)
Iowa Woodlands	(IAN-202)
Iowa Prairies	(IAN-203)
Iowa Wetlands	(IAN-204)
Iowa Waterways	(IAN-205)

IOWA ENVIRONMENTAL ISSUES

Iowa Habitat Loss and Disappearing Wildlife	(IAN-101)
Iowa Air Pollution	(IAN-102)
Iowa Water Pollution	(IAN-103)
Iowa Agricultural Practices and the Environment	(IAN-104)
People, Communities, and Their Iowa Environment	(IAN-105)
Energy in Iowa	(IAN-106)
Iowa Waste Management	(IAN-107)

Iowa Trails Council
1202 Central Avenue
Center Point, Iowa 52213

Information on Iowa trails; locations, uses, accesses, etc.

Iowa Trappers Association
1723 20th St.
Bettendorf, Iowa 52722-3829

Iowa Tree Farm Committee
1805 West Jefferson
Fairfield, Iowa 52556

Iowa Wildlife Federation
3135 Douglas Suite 103
Des Moines, Iowa 50310

Distributes National Wildlife week packets to educators. Sponsors workshops, displays and wildlife reintroduction projects.

Iowa Wildlife Rehabilitator's Association
Morning Star Farm
1535 280th Street
Brighton, Iowa 52540

Newsletter and networking of Iowa Wildlife Rehabilitators.

Iowa Wildlife Society
124 Science II
Iowa State University
Ames, Iowa 50011

Iowa Woodland Owners Assoc.
1404 Colwell Ave.
Charles City, Iowa 50616

Iowans for Better Fisheries
495 15th Ave. SW
Altoona, Iowa 50009-1113

Izaak Walton League of Iowa
5927 Highland Circle
West Des Moines, Iowa 50266

Pheasants Forever
1205 Ilion Ave
Chariton, Iowa 50049

(two addresses)
2880 Thunder Rd.
Hopkinton, Iowa 52237

Sierra Club Iowa Chapter
1004 Kellogg
Ames, Iowa 50010

Soil and Water Conservation Society
7515 NE Ankeny Road
Ankeny, Iowa 50021

A series of cartoon stories in English or Spanish that provides information on food, land, wildlife museum, etc. Targeted for ages 9-11.

The Nature Conservancy
Iowa Field Office
108 3rd St. Suite 300
Des Moines, Iowa 50309-4658

University of Iowa
Institute of Public Affairs
Division of Continuing Education
The University of Iowa
Iowa City, Iowa 52242

Iowa Local Government's Role and Responsibilities in the Implementation of Federal & State Environmental Legislation. A short guidebook with readable summaries of environmental legislation. $2.00 per copy. Grades 7-12.

University of Northern Iowa
Environmental Issues Instruction (eii)
Center for Energy and Environmental Education
University of Northern Iowa
Cedar Falls, Iowa 50614-0293

Environmental Issues Instruction (eii) K-12

Appendix

My most memorable experience in first grade was the field experience provided by my teacher at a nearby stream in Franklin County, Iowa, and observing a kingfisher along a fast flowing creek for the very first time.

— Duane Toomsen

For the following workshop information:
Project WET
Iowa Academy of Science
175 Baker Hall
University of Northern Iowa
Cedar Falls, Iowa 50614

USDA Natural Resources Conservation Service
693 Federal Building
210 Walnut Street
Des Moines, Iowa 50309

For information on the following:

Lines on the Land (Develops appreciation of what is around us and includes a videotape. Contains 16 lesson plans, and colorful booklet showing agriculture practices. May be purchased or borrowed at no cost from each County Conservation Board.) Grades 5-9. To purchase contact National Association of Conservation Districts (800) 825-5547.

Also available: Backyard Wildlife Publication, posters, booklets, brochures, etc., on water quality and Natural Resources Conservation. Counties sponsor an annual poster contest and teacher award program with Conservation Districts of Iowa in each county. www.ia.nres.usda
NACD has a catalog of education materials.

Wild Turkey Federation
3158 Pacific
Woodburn, Iowa 50275

Contact your local bookstore for:
Wildflowers of the Tallgrass Prairie by Sylvan T. Runkel and Dean M. Roosa
Wild Flowers of Iowa Woodlands by Sylvan T. Runkel and Alvin F. Bull

Iowa Agricultural Commodity Groups

Agribusiness Association of Iowa
900 E. Des Moines Street
Des Moines, Iowa 50309-5549

Iowa Beef Industry Council
P.O. Box 451
Ames, Iowa 50010

Iowa Corn Growers Association
306 West Towers
1200 35th Street
West Des Moines, Iowa 50266

Iowa Egg Council
535 E. Lincoln Way
PO Box 704
Ames, Iowa 50010

Iowa Farm Bureau Federation
5400 University Avenue
West Des Moines, Iowa 50266

Iowa Pork Producers Association
1636 NW 114th Street
Clive, Iowa 50325-7071

Iowa Poultry Association
535 E. Lincoln Way
P.O. Box 704
Ames, Iowa 50010

Iowa Sheep Bureau
P.O. Box 778
Boone, Iowa 50036

Iowa Soybean Association
4554 NW 114th St.
Urbandale, Iowa 50322

Iowa Turkey Federation & Marketing Council
P.O. Box 825
Ames, Iowa 50010

Midland Dairy Council
101 NE Trilein Drive
Ankeny, Iowa 50021

Local Agencies and Organizations

Community Tree Stewards
County Conservation Boards
Garden Clubs
Master Conservationist
Master Gardners
Master Woodland Mangers
Soil and Water Conservation Districts
Solid Waste Commission

Resource Materials and National and International Organizations

Agricultural Research Service
New Orders, Superintendent
of Documents Information
P.O. Box 371954
Pittsburgh, PA 15250-7954

Agricultural Research, a monthly magazine for teachers that includes latest research and information in all areas of Agriculture.

African Wildlife Foundation
1400 16th St. NW Suite 120
Washington, DC 20036
www.awf.org

Fact sheets on elephants, rhinos, ivory trade, etc. Brochures quarterly newsletter, buttons, stickers. All Ages.

American Cave Conservation Association
Box 409
Horse Cave, KY 42749

(Emphasizes education as the way to preserve caves and groundwater.) Members receive a quarterly magazine and newsletter. The association also operates the American Cave Museum, a national nonprofit museum located in Horse Cave, KY. Call: 270/786-1466 for more information.

American Chemical Society
115 16th Street
Washington, D.C. 20036
1-800-227-5558
1-800-227-5559

(Grades 7-12) Free single pamphlets as listed below:

___Acid Rain, ___Biotechnology, ___Chemical Risk: A Primer

___Chemical Risk: Personal Decisions, ___Global Climate Change

___Ground Water, ___Hazardous Waste Management, ___ Pesticides,

___Recycling.

American Geological Institute
4220 King Street
Alexandria, VA 22302

Books, pamphlets, "The Making of A Continent" quarterly magazine, and "A Study in Time" poster.

American Institute of Architects
1735 New York Ave. NW
Washington, DC 20006
www aiaonline.com

Free pamphlets and Careers in Architecture.

American Rivers
801 Pennsylvania Avenue, SE
Washington, DC 20003-2167

Dedicated to protection of America's outstanding rivers and their landscapes.

American Society for the Prevention Of Cruelty to Animals
424 East 92nd Street
New York, NY 10128-6804
www.aspca.org

Animal Welfare Institute
P.O. Box 3650
Washington, DC 20007

Free copy of "The Endangered Species Handbook" which includes classroom projects for science fairs, and collated articles and films on endangered species.

Appropriate Technology Transfer for Rural Areas
P.O. Box 3657
Fayetteville, AR 72702

Will supply educators with prepared technical materials on environmentally sound sustainable agriculture practices. Call to request list 1-800-846-9140. Materials are designed for farmers, but educators can modify them or use them for background information.

Bat Conservation International
P.O. Box 162603
Austin, TX 78716-2603
www.batcon.org

Slide presentations, videos, posters, magazine, gift catalog, for all ages.

Caribbean Conservation Corporation
Box 2866
Gainesville, FL 32602

Adopt a turtle program, newsletters, and other publications on preserving marine habitat. K-12.

Center for Marine Conservation
Suite 500
1725 DeSales Street, NW
Washington, DC 20036

Offers newsletters, slide shows, posters, coloring books, informational packets to teachers on marine debris issues, posters of ocean animals, sea turtle coloring book and more. Grades K-12

Conservation Technology Information Center
1220 Potter Dr. Room 170
West Lafayette, IN 47906-1383
Ctic@ctic.purdue.edu

Agricultural based information and data transfer center

Dawn Publications
14618 Tyler Foote Road
Nevada City, CA 95959
(800)-545-7475

Publications in three groups:
1. Nature awareness guides for educators, most notably:
   Sharing Nature with Children by Joseph Cornell
   Sharing Nature with Children II by Joseph Cornell
   Sharing the Joy of Nature video by Joseph Cornell
   Journey to the Heart of Nature by Joseph Cornell
   Play Lightly on the Earth: Nature Activities for Children Ages 3 to 9 by Jacqueline Horstall

2. Nature awareness picture books for children, most notably:
   My Favorite Tree: Terrific Trees of North America by Diane Iverson
   The Tree in the Ancient Forest by Carol Reed-Jones
   A Swim Through the Sea by Kristin Joy Pratt
   A Drop Around the World by Barbara McKinney
   Discover the Seasons by Diane Iverson
   This is the Sea that Feeds Us by Robert F. Baldwin (Iowa author)

3. Teacher's Guides that accompany children's picture books, for supplementary classroom use.

The frog does not drink up the pond in which he lives.

— Indian Proverb

Defenders of Wildlife
1101 14th St. NW STE 1400
Washington, DC 20005-5605

Protects wild animals and plants in their natural communities. Members receive a newsletter, magazine, action alerts, and annual endangered species reports.

Delta Education, Inc.
80 Northwest Blvd.
Nashua, NH 03063

O.B.I.S. (Outdoor Biology Instructional Strategies) Elementary and Secondary)

Ducks Unlimited
One Waterfowl Way
Memphis, TN 38120

Earth Justice Legal Defense Fund
180 Montgomery Street, Suite 1400
San Francisco, CA 94104-4209
www.earthjustice.org

Earthworks Press
P.O. Box 1117
Ashland, OR 97520

50 Simple Things You Can Do To Save the Earth
50 Simple Things Kids Can Do To Save the Earth
(Basic information in each book)

Environmental Defense Fund
257 Park Avenue South
New York, NY 10010
www.edf.org

Forest Resource Environmental Education
1405 Lilac Drive No. STE.130
Minneapolis, MN 55422
forest@freenetwork.org

Education materials on forest and forest management.

Friends of the Earth
1025 Vermont Avenue NW
Washington, DC 20005-6303
www.foe.org

Friends of the Forest
21947 Plummer Street
Chatsworth, CA 91311

Fund for Wild Nature
P.O. Box 86151
Portland, OR 97286

HEART
P.O. Box 681231
Houston, TX 77268-1231
www.ridleyturtles.org

Help Endangered Animals-Ridley Sea Turtles. Special student rates.

Humane Society of the United States
2100 L Street NW
Washington, DC 20037

International Wildlife Coalition
Whale Adoption Project
635 N Falmouth Hwy, Box 288-N
Falmouth, MA 02556

Izaak Walton League of America
707 Conservation Lane
Gaithersburg, MD 20870-2983
1-301-548-0150

Save-Our-Streams, Wetlands Adoption Kit and Quarterly Magazine.

League of Conservation Voters
1707 L Street NW Suite 750
Washington, DC 20036
www.lcv.org

National Aquarium
Education Department, Pier 3
501 E Pratt Street
Baltimore, MD 21202

Background information activities, ready-to-copy pages, glossary, curriculum called "Living in Water." (Intermediate and advanced.)

National Arbor Day Foundation
100 Arbor Avenue
Nebraska City, NE 68410

Education materials on values and function of trees and booklet on tree identification. Also, a national poster contest.

National Association for Interpretation
P.O. Box 2246
Fort Collins, CO 80522
888-900-8283
www.interpnet.com

Various environmental education materials. NAI offers an annual peer juried research journal, regional and national conferences and newsletter, a bimonthly magazine, books, and tapes on interpretation, a biweekly jobs newsletter and a certification program for professional interpreters.

National Audubon Society
700 Broadway
New York, NY 10003

Magazine, books, curricula, children's newspaper and teacher's guides.

National Energy Foundation
5225 Wiley Post Way, Suite 170
Salt Lake City, UT 84116

Provides energy enriched science, technology, and society programs and materials for school populations.

Look at the exquisite yellow flowerets in the center, become very small with them. Be the flower, be the trees, the blowing grasses. Fly with the birds, jump with the squirrel!

— Sally Carrighar

National Geographic Society
Educational Services
P.O. Box 98199
Washington, DC 20090-8199
www.nationalgeographic.com

Films, filmstrips, videos, teacher's guides, activity sheets, booklets for rent or purchase.

National Parks and Conservation Association
P.O. Box 97202
1776 Massachusetts Ave. NW
Washington, DC 20007-1171

Their aim is to protect and improve the national park system with an emphasis on planning and management.

National Park Service
Interior Building
P.O. Box 37127
Washington, DC 20013-7127

Booklets, brochures, films, videos, etc., on parks, wilderness and issues related to their management. Biological Diversity Curriculum.

National Wild Turkey Federation
Wild Turkey Building, Box 530
Edgefield, SC 29824-0530
1-800-637-3106
www.nwtf.org

National Wildlife Federation
1400 16th Street NW
Washington, DC 20036-2266

NatureScope (K-8) Educator resources for learner activities and background information.
Ranger Rick (K-6) Learners activities and information.
Your Big Backyard (Ages 3-5)
Animal Tracks
National Wildlife and International Wildlife (older students and adults)

National Wildlife Rehabilitator's Association
NWRA Central Office
14 N 7th Ave.
St. Cloud, MN 56303-4766
320-259-4036
www.nrawildlife.org nwra@cloudnet.com

Newsletters, symposia proceedings, information on in-school rehabilitation projects.

Natural Resources Defense Council
40 West 20th Street
New York, NY 10011
www.nrcd.org

Scientific research, public education, and legal action in combating deterioration of the environment. The Amicus Journal and NRDC Newsline.

North American Association for Environmental Education
410 Tarvin Road
Rock Spring, GA 30739

NAAEE is an organization for environmental education educators. NAAEE offers journals, conferences, bibliographies of research in EE topics.

Nature Conservancy International
1815 N. Lynn Street
Arlington, VA 22203

Works to preserve worldwide biological diversity, mostly by purchasing land that contains threatened habitats. Manages over 1,000 U.S. sanctuaries.

Pronatura
Pronatura Peninsula de Yucatan, A.C.
Calle 1-D No 234-A Entre 36 Y 38
Merida, Yucatan Mexico

Iowa's sister state in the Yucatan of Mexico is home for Pronatura. Contact for sea turtle restoration projects and critical habitat protection in Mexico.

Rainforest Alliance
65 Bleecker St. 6th Floor
New York, NY 10012-2420

Aims to develop a broad-based constituency of conservation and other professional groups, scientists, businesses, and individuals to save tropical rain forests. Members receive a bimonthly newsletter.

Save America's Forests
4 Library Ct. S.E.
Washington, DC 20077-1110

Save the Manatee Club
500 N. Maitland Avenue
Maitland, FL 32751

A number of educational materials are available. Manatee - An educator's Guide free, books, video, and other programs and services for all ages.

Sierra Club
85 Second Street 2nd Floor
San Francisco, CA 94105-3441
information@sierraclub.org
http://www.sierraclub.org

Magazines, books, some videos on wilderness and other topics.

Schlitz Audubon Center
1111 E Brown Deer Road
Milwaukee, WI 53217

Living Lightly in the City (An urban and suburban environmental curriculum, two volumes: K-3 and 4-6).

Living Lightly on the Planet (Interdisciplinary units designed to involve students to solve local environment problems. 2 volumes: 7-9 and 10-12).

Soil and Water Conservation Society
7515 NE Ankeny Road
Ankeny, IA 50021

Information, curricula, booklets books, etc. on soil and water conservation techniques and philosophy. Journal.

Student Conservation Association
689 River Road
P.O. Box 550
Charleston, NH 03603

The Acid Rain Foundation
1410 Varsity Drive
Raleigh, NC 27606

Curriculum guide for grades 4-8 and Acid Rain Science Projects for grades 6-12. Call 800-542-6657 for additional titles.

The Garden Club of America
Conservation Committee
14 E 60th St. FL 3
New York, NY 10022-1006

Environmental education packet for grades 3-5.

The Gorilla Foundation
2550 Ninth Street, Suite 1081
Berkley, CA 94710-9985

The International Crane Foundation
E11376 Shady Lane Road
Baraboo, WI 53913-9924

Six different activity packets, films, videos, and background information for various age levels.

The International Wolf Center
1396 Hwy 169
Ely, MN 55731-8129
www.wolf.org

Provides informational literature about wolf restoration and exhibit in Ely, MN.

The Marine Mammal Center
Marin Headlands, GGNRA
Sausalito, CA 94965

The Nature Conservancy
4245 Fairfax Drive Suite 100
Arlington, VA
www.tnc.org

National magazine, sponsorship of field experiences. Can refer you to your nearest local chapter with programs throughout Latin America, Asia and the Pacific Islands.

The North American Groundwater Foundation
5561 S 48th Street Ste. 215
Lincoln, NE 68516-9924

Offers quarterly eduction catalog and events publication regarding groundwater. Various age levels.

The Trumpeter Swan Society, Inc.
3800 County Road 24
Maple Plain, MN
ttss@hennopinparks.org

The Whale Museum
62 First Street North
P.O. Box 945
Friday Harbor, WA 98250
1-800-562-8832

The Wilderness Society
900 Seventeenth St. NW
Washington, DC 20006-2596

The Wildlife Society
5410 Grosvenor Lane, Suite 200
Bethesda, MD 20814

U.S. Department of Agriculture
Agriculture in the Classroom
Room 635A
U.S. Department of Agriculture
Washington, DC 20250

Resource Guide to Educational Materials about Agriculture: A Project Agriculture in the Classroom.

U.S. Department of Commerce
Office of Protected Resources
Information Requests
National Marine Fisheries Service
1315 East-West Highway 13th Floor
Silver Springs, Maryland 20910

For materials grades 7-12.

U.S. Environmental Directories
P.O. Box 65156
St. Paul, MN 55165

The Directory of Environmental Websites on the Internet of over 400 non-governmental organizations on the Internet with topics such as water pollution, etc.

U.S. Environmental Protection Agency
Region 7
726 Minnesota Avenue
Kansas City, KS 66101

Films, videos, brochures, curricula, and other information resources for loan or for free.

U.S. Fish and Wildlife Service
Attn: Publications Department
18th and C Streets, NW
Washington, DC 20240

A variety of brochures, pamphlets and other informational materials on fish and wildlife resources. Biologue fact sheets on endangered species. Manages national wildlife refuges.

U.S. Forest Service
Natural Resources
Conversation Education
Box 96090
Washington, DC 20090-6090

Posters, fire prevention information, brochures, etc.

Whale Adoption Project
70 East Falmouth Hwy.
East Falmouth, MA 02536
www.IWC.org

Offers school classes an opportunity to adopt a while of their choice. Includes adoption papers, information about whales, gift catalog, all ages.

Wildlife Conservation Society
2300 Southern Blvd.
Bronx, NY 10450

World Wildlife Fund
1250 twenty-fourth St. NW
Washington, DC 20037
www.worldwildlife.org

Environmental and Educational Terms

(The meanings of these words relate to environmental education in general.)

Abiotic — a non-living factor in an environment: e.g., light, water, temperature.

Acid rain — a type of pollution that occurs when sulfur and nitrogen compounds in the atmosphere react with water vapor. The rain that forms from this vapor is acidic and can damage forests, aquatic organisms, crops, buildings and other things.

Adaptation — a behavior, physical feature or other characteristic that helps an animal or plant survive and make the most of its habitat. Example: Tendrils on some plants enable them to climb to reach sunlight, and sharp teeth in tigers allow them to tear the meat of their prey.

Aerobic — usually in reference to bacteria which thrive in the presence of oxygen.

Aesthetic value — appealing to one's sense of the beautiful.

Affective learning — learning that affects, or contributes to the development of attitudes, beliefs, values, and leads the learner to act in certain ways, based on personal convictions.

Affluent societies — wealthy societies composed of citizens with abundant income, resources, food, and energy resources.

Allowable cut — the amount of wood fiber that may be harvested annually or periodically from a specified area over a stated period in accordance with the objectives of management.

Anaerobic — usually in reference to bacteria which thrive in the absence of oxygen.

Bauxite — ore used to make aluminum for beverage cans, etc.

Biodegradable — having the ability to be broken down into simpler components by living organisms.

Biological controls — utilization of existing natural enemies of crop pests to control their numbers. Example: Ladybugs control aphids.

Biological diversity — the diversity of life on earth, reflected in numbers and varieties of animal and plant species, populations, and the ecological communities they form.

Biologist — a person who studies living organisms and their relationships to one another.

Biome — a major land ecosystem such as forest, desert, savannah, that is composed of individual communities of life.

Biosphere — the part of the earth's crust, water, and atmosphere where living organisms can subsist.

Biota — the animal and plant life of a region or period.

Biotic potential — the capacity of a population of animals or plants to increase in numbers under optimum environmental conditions.

Built environment — the surroundings and settings constructed by humans.

BTU — British Thermal Unit; a way of expressing a unit of heat.

Carrying capacity — the number of organisms of a given species and quality that can survive in a given ecosystem without causing deterioration thereof.

Change — a process whereby everything in an ecosystem turns into something else. Example: a frog eats a mosquito, a fish eats the frog, and a heron eats the fish. This is also true for land; prairies become farmland and so on.

Chlorofluorocarbons (CFCs) — a group of chemicals that are used to produce plastic foam, coolants, and many other products.

Channelization — the process of changing and straightening the natural path of a waterway.

Clear-cut — a practice of harvesting timber in which all the trees from a given area are removed.

Climax — the stage of plant or animal succession when environmental conditions have been stable long enough for an area to develop a semi-permanent biome.

Cognitive learning — the learning of factual knowledge.

Community — all the plants and animals in a particular habitat that are bound together by food chains and other interrelationships.

Composting — a method of hastening the natural decomposition process for organic waste products.

Consumption — processing, buying or using a product.

Conservation — the careful use of a resource, thus ensuring its availability over time.

Conservationist — one who actively conserves resources and supports policy which encourage or requires the same.

Contaminant — any substance added to a material which makes the material unusable.

Contour farming — plowing and planting in directions that match the slope of the land; a practice that retards erosion.

Culture — the customs, art, beliefs, and institutions created by a group of people at a particular time and place. The activities and products are derived from, interact with, and modify the environment of these people.

Curbside recycling — a method of collecting separated recyclables at the curb in the same way garbage is collected.

Cycle — an event or series of events that is regularly repeated. Natural cycles include the water and the soil nutrient cycles, some animal population fluctuation, seasons, and other events.

Deforestation — the clearing of a forest.

Degradation — to lower the quality of the environment. Also refers to the natural breakdown of chemicals into simpler constituents.

Desert scrub — arid environments with irregular rainfall; highly varied plantlife with leafless, drought deciduous, or evergreen species of trees, shrubs, herbs and grasses, yuccas agaves, and cacti.

DNR — the Department of Natural Resource, a state agency which manages, protects, conserves, and develops Iowa' natural resources.

Dominant species — plant or animal species which exert major controlling influence on the community. Removal of dominant species results in important changes in the community.

Dredging — the process of digging up and removing materials from wetlands or waterways to clear them or make them deeper or wider.

Drop-off recycling — a method of collecting separated recyclables where an outside bin is provided at a specific location, and people are responsible for taking their recyclables to the bin.

Ecology — a branch of science concerned with the interrelationship of organisms with their environment. A scientist who studies these relationships is called an 'ecologist.'

Economic community — that portion of society actively involved in the production, development, distribution, or management of material wealth.

Ecosystem — the populations of a community which actively utilize the available energy, air, water, soil, and chemicals of a given area to form an ecosystem.

Effluent —the outflows from sewage or industrial plants.

EIS — Environmental Impact Statement, which reviews the possible environmental changes and impacts that would be made when a project is implemented.

Endangered species — a species that is in immediate danger of becoming extinct.

Energy flow — the movement of energy through a system which can change the state of something. Example: energy from the sun starts the process of photosynthesis in plants which in turn produces nutrients (energy) for plants.

Environment — all living and non-living factors that affect all organisms. Non-living factors include water, nutrients, temperature, light and soil.

Environmental action group — an organization whose primary purpose is to initiate public or legal action in a specific direction influencing public policy or action.

Environmental educator — any world citizen who uses information and educational processes to help people analyze the merits of the many and varied points of view, usually present on a given environmental issue. This citizen is not the mediator, negotiator, nor activist, but is rather a developer of skills and information which prepares learners to participate in environmental decision making.

Environmental ethics — a general set of attitudes and values held by an individual that influences his or her choice and behavior consistent with maintaining a quality environment. Example: recycling, conserving resources.

Environmental hazard — a condition existing in one's surroundings which may be dangerous or threatening to health and safety. Example: toxic spill, air, water, soil pollution.

Environmentalist — any world citizen who advocates, with greater or lesser action, that wrongs against our environment should involve change, improvements, and protection.

Environmental resistance — the limiting effect of environmental conditions on the numerical growth of a population.

Erosion — the loosening and movement of soil by wind, moving water, ice, and landslides.

Ethics — a personal or social moral code.

Existence value — A term used by environmental economists to describe the value that is held of a resource through knowledge of its continued existence. Example: persons who may never see or encounter a rare species may contribute to its support.

Exotic — a foreign plant or animal introduced into an area where it is not native.

Experiential education — specifically means learning by doing; it is an open-ended, multi-dimensional approach whereby the eductor provides experience for the learner.

Extinct — no longer living.

Finite — having bounds or limits; capable of being counted or measured; the opposite of infinite.

Food chain — the transfer of food energy from the source in plants through a series of animals, with repeated eating and being eaten. Example: a green plant, a leaf-eating insect, and an insect-eating bird would form a simple food chain.

Food web — an interlocking pattern of food chains.

Forest management — the practical application of scientific, economic, and social principles to the administration of a forest estate for specified objectives.

Fossil fuels — coal, oil, and other energy sources that formed over millions of years from the remains of ancient plants and animals.

Freshwater marshes — open wetlands that occur along rivers and lakes, and in many other areas.

Freshwater swamps — forested or shrubby wetlands.

Fungicide — any chemical preparation used to control fungal pests.

Gender fair — equally representative, fair, and unbiased to both females and males.

Global climate change — the predicted change in the earth's climate brought about by the accumulation of pollutants in the atmosphere. The effects of global climate change have not been completely determined.

Global perspective — a point of view that considers the international implications of such matters as acid rain, cutting of the rain forest, drought, scarce resources, hunger, over population, and disease.

Grassland — a vegetation community in which grasses are the most dominant plants.

Gray water — the term given to domestic waste water composed of wash water from sinks, kitchen skins, bathroom sinks and tubs, and laundry tubs.

Greenhouse effect — the trapping of heat by gases, such as carbon dioxide, in the earth's atmosphere, causing a rise in the ambient temperature of the earth.

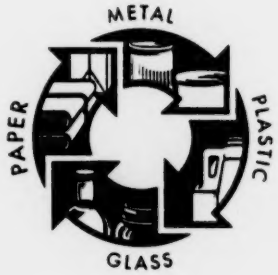
Goundcover — any plant producing a protective mat to prevent erosion.

Groundwater — water that fills the spaces between rocks and soil particles underground. Groundwater is replenished when rainwater trickles through the soil. Surface water, such as lakes and rivers, is often replenished by groundwater.

Habitat — the location where an organism, population, or community lives.

Half-life — time required for a chemical to deteriorate to half of its original volume. Example: the half-life of DDT in the environment is 15 years; of radium is 1,580 years.

Harmony with the environment — the ability to live in ways that preserve the elements of the environment and to disrupt the natural ecosystems as little as possible.



Hazardous waste — any waste material which can be harmful to the health of living organisms.

Herbicide — a substance or preparation for killing plants.

High density polyethylene (HDPT) — a plastic resin most familiar as milk jugs or laundry bottles.

Holistic — an approach that emphasizes the complex systemic interrelationships between members of a system such that the whole is greater than the sum of the parts.

Hydrocarbons — a family of chemical compounds containing carbon and hydrogen that are found particularly in fossil fuels.

Increment — growth accretion generally expressed in volume per area per year. Also spoken of as annual yield.

Indicator species — a species whose presence or absence suggests the quality of a particular environment.

Indigenous — a naturally occurring or native species.

Infusion — the mixing of a number of factors to create a new entity.

Inorganic — composed of matter other than plants or animals.

Insecticide — any chemical preparation used to control insects.

Integration — the bringing together of different parts into a functional or unified whole.

Interdependency — the relationships by which all things in the environment are connected to and dependent upon each other.

Interdisciplinary — utilizing information in a coordinated way from a variety of fields or disciplines in order to deal adequately with all dimensions of issues.

Interest group — an organization whose primary purpose is to raise public consciousness, encourage the passage of legislation, or communicate with like groups over a common interest.

Interrelationships — the interdependencies of species with one another and with the various elements of their environment.

Intricacy — possessing many complex parts and referring herein to matter of our biosphere.

Introduced species — an animal or plant species that has been brought into area where the species was not indigenous. Introduced species can compete with, and possibly cause problems for, native species. Also called exotic or non-native species.

Irrigation — method of transporting water from areas of presumed abundance to locations having sufficient soils, but limited local water supply, for the purpose of crop production.

Landfill — a method of processing garbage by creating a hole in the ground with a bottom which should not allow liquids out, and adding garbage, usually covered by six inches of soil every day.

Land use — ways in which the land is used which includes forest land, cropland, wetlands, pastureland, and wild lands, but is not limited to park, roads, industry, and towns.

Leaching — the process by which materials on or in soil are dissolved and carried by water seeping through the soil.

Learning styles — processing and absorbing information and skills by a variety of methods, such as auditory or kinesthetic learning.

Life cycle — the continuous sequence of changes undergone by an organism from one primary form to the development of the same form again.

Lifecycle cost — the cost of any item compared to how long it lasts.

Limiting factor — influences in the life history of any organism, e.g., food, water, shelter, space, disease, predation, climatic conditions, pollution, hunting, poaching, soil conditions, and accidents. When one or more of these exceeds the limit of tolerance of a species, it becomes a threat for the population of that species.

Market hunting — the hunting or trapping of animal to sell for profit.

Microhabitat — a "small habitat" within a larger one in which environmental conditions differ from those in the surrounding area. Example: a hole in a tree trunk or an animal carcass is a microhabitat within the forest.

Microorganism — living organisms so small that individually they can only be seen with the aid of a microscope.

Monoculture — the cultivation of a single product (such as corn or cotton) on a piece of land, to the exclusion of other products.

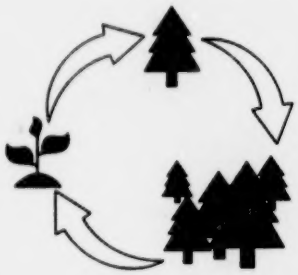
Multiple use management — using the same resource in a number of different ways for different purposes: e.g., mining, logging, camping can all occur within a forest habitat.

Native species — a species that is indigenous to an area.

Natural resource — a product occurring in a natural state which is viewed as a commodity by society.

Natural selection — a process in nature resulting in the survival and perpetuation of only those forms of plant and animal life having certain favorable characteristics that enable them to adapt best to a specific environment.

Nature Study — a study that is primarily concerned with the identification of organisms and their structures and functions.



Niche — the role played by an organism in a biological community; its food preference, requirements for shelter, special behaviors, and the timing of its activities. The ecological niche of an organism has little to do with where it is found, but much more to do with its function or role, e.g., predator, decomposer, and how it performs that function.

NIMBY — an acronym which stands for the attitude expressed by people who say: "...not in my back yard!" in reference to issues of where to put landfills, hazardous waste or any other kinds of environmental problems.

Non-biodegradable — that which cannot be broken down into more basic chemical components by bacterial or other action.

Nonpoint pollution — pollution that doesn't come from a single, identifiable source, such as materials that wash off farmland, streets, lawns, or other surfaces.

Non-renewable — referring to resources which cannot be restored or renewed at a rate which would make them available to use at any time in the foreseeable future.

Non-renewable resource or energy — a resource such as minerals, oil, and coal that is found in fixed, depletable supplies on earth.

Open dump — a method of garbage handling where garbage is dumped in one place and not covered or kept from wildlife, or kept out of the water supply.

Organic — pertaining to animal or vegetable produced chemical substances of basically carbon structure.

Organic gardening — a method of gardening or farming in which soil fertility is maintained with organic matter (such as compost and natural fertilizers) in order to ensure the health of the plant.

Organism — a living thing.

Outdoor education — use of outdoor settings to teach a wide variety of activities and concepts. Advocates of this approach believe concepts about the natural environment are best taught outdoors.

Overconsumption — consuming more than what is required to maintain a reasonable standard of living.

Overgrazing — the process that occurs when cattle, sheep, goats, or other animals graze in too small an area for too long a period. Overgrazing often results in soil erosion, the destruction of vegetation, and other problems.

Overharvesting — depletion of a plant or animal resource which is normally managed for sustainable levels due to mismanagement by individuals or societies.

Ozone — a form of oxygen.

Ozone layer — a protective layer of ozone high in the earth' atmosphere that filters out much of the sun's harmful ultraviolet radiation.

Ozone hole — the thinning of this layer caused by the release of chlorine atoms from chemicals such as CFCs.

Pesticides — any substance or chemical applied to kill or control weeds, insects, fungi, algae, rodents, and other undesirable pests; includes herbicides, fungicides, and insecticides.

Photodegradable — that which can be broken down by light.

Photosynthesis — the process by which plants use the sun's energy to convert carbon dioxide and water into sugar and oxygen.

Plastic — human made materials consisting of large molecules called polymers; usually made from petroleum.

Poach — to hunt, kill, or collect a plant or animal illegally.

Point pollution — pollution that comes from a particular source, such as from a factory, or sewage treatment plant, or home.

Pollution — a human caused changed in the physical, chemical or biological conditions of the environment that creates an undesirable effect on living things.

Polystyrene — a plastic resin most familiar in the expanded foam form. Examples; foam cups, peanut-shaped packing beads, insulation. Unexpanded polystyrene is a rigid plastic.

Population — an interbreeding group of animals or plants of the same species that live in the same area.

Population dynamics — the amount of time, space, and environmental conditions that determine the carrying capacity of the land of a given area.

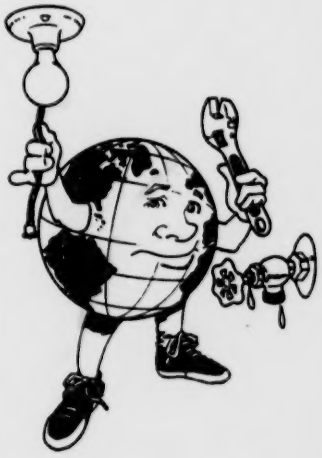
Population inventory — a measure of the current density of a species of animal or plant.

Prairie pothole region — an area stretching from central Iowa, north through Minnesota; the Dakotas, and northeastern Montana, into the Canadian provinces of Alberta, Saskatchewan, and Manitoba, characterized by a fairly flat landscape of deep and shallow marshes, wet meadows, and rich soils. The wetlands, dubbed "potholes" are the result of past glacial action.

Precycle — decisions made at the time of purchase or use, with choices based on whether or not an item or its components are consistent with environmentally disposal. Examples: choosing recyclable food or beverage packaging as opposed to non-recyclable; choosing products that are not excessively packaged.

Preservation — action which maintains an area intact for the protection of the natural resources of the area.

Preservation site — the areas maintained for the protection of biological diversity.



Rare species — a species that has a small number of individuals and/or has a limited distribution. A rare species may or may not be endangered or threatened.

Recycle — the process of sorting and collecting waste materials which are then reprocessed, resold, or reused.

Red tide — a proliferation of a marine plankton that is toxic and often fatal to fish. This natural phenomenon may be stimulated by the addition of nutrients or other factors.

Reforestation — replanting an area with trees after logging, fire, disease, or drought.

Refuge — a haven or sanctuary for wildlife that may allow regulated hunting, but which is managed for the maintenance of the habitat and user species.

Reintroduction of species — a management technique where a specie is reintroduced into historic range; e.g., the replanting of animals or plants in areas where they have become extinct.

Renewable resource — a resource that can be replaced through natural processes if it is not overused or contaminated. For example, water and trees are renewable resources.

Residential EE experience — a 24-hour or longer experience at a facility designed to house, feed, and educate people about the environment.

Resource — a portion of an environment upon which people have placed or assigned value or see as being available for use.

Resource distribution — the ways in which natural resources are distributed throughout a region or the world. Examples: the U.S. is rich in timber, agricultural land. South Africa is rich in many metals, and gemstones.

Reusable — any product which can either be reused in its present form or used for a different purpose.

Risk assessment a process that analyze the short- and long-term risks posed by certain technologies or natural process.

Runoff — water, including rain and snowmelt, that runs off the surface of the land and into rivers, streams, and other water supplies.

Salt marshes — saltwater wetlands that occur along many coasts adjacent to a gulf, sea, or ocean.

Sanctuary — a refuge for wildlife where hunting is illegal.

Sanitary landfill — a method of putting garbage in a hole which limits the chance that garbage will cause health problems for either humans or wildlife. (Iowa has only sanitary landfills.)

Savanna — a parklike grassland with scattered trees or clumps of trees.

Scientific method — the methodology which involves observation, identification, description, experimental investigation, and theoretical explanation of natural phenomena.

Sense of place — ability to recognize each place in the environment as having its own unique values, aside from comparisons to other places in the environment.

Sere — the series of communities that follow one another in a natural succession, as in the change from a bare field to a mature forest.

Silvicides — any chemical preparation used to control unwanted trees.

Silviculture — the science and art of cultivating forest crops based on the forest trees and strands with particular reference to site factors as a basis for the practice of silviculture.

Slash — the residue left on the ground after felling timber.

Slash-and-burn — developed by felling and burning trees to make the land arable.

Slough — an inlet from a river; backwater, tideflat; a creek in a marsh.

Smog — low-level ozone, soot, sulfur compounds, and other pollutants in the atmosphere that cause poor visibility and create hazardous conditions for living things.

Solid waste — discarded solid or semi-solid material, such as paper, metals, and yard waste. The solid waste stream is the sum of all the solid waste that is continuously thrown out.

"Spaceship Earth" — a metaphor for the earth as a finite ecosystem in which resources must be tended and the ever-changing balance between humans and their environment preserved, if life is to survive.

Species — natural population or group of populations that transmits specific characteristics from parent to offspring. They are reproductively isolated from other populations with which they might breed.

Static — showing little change, usually used in reference to a population or to a condition of habitat.

Stewardship — the responsibility to manage resources in a way that regards the rights of others. In environmental education, a stewardship ethic embraces the needs of all elements of the environment for now and the future.

Succession — the gradual replacement of one community by another.

Sustainability — is a transition that requires a careful balance between long-term and short-term goals and an emphasis on sufficiency, equity, and quality of life rather than on quantity of output.

Synergism — the cooperative interaction of two or more chemicals or other phenomena producing a greater total effect than the sum of their individual effects.

Technology — the application of a science and design to help solve societal problems.

Thematic — a topic or idea that can be expanded upon in a variety of ways.

Threatened species — a species whose number are low or declining. A threatened species is not in immediate danger of extinction, but it is likely to become endangered if it isn't protected.

Toxic — a poisonous substance.

Transdisciplinary — a multi-dimensional approach to learning that transcends the disciplines and centers around themes, issues, or problems to be solved.

Tundra — Treeless vegetation in regions with long winters, high winds, and low annual temperatures.

Waste management — a program or plan to handle and dispose of the wastes generated by individuals and society. Examples: sewage, toxics, manure, nuclear waste, solid waste.

Wetlands — an area where the water table stands near, or above, the land surface for at least a portion of the year. Wetlands support plants and animals that are adapted to living in a watery or saturated environment. Examples: bogs, freshwater and saltwater marshes, potholes, and freshwater and saltwater swamps.

Wilderness area — a roadless area established by the federal government to conserve its primeval character and influence for public enjoyment under primitive conditions in perpetuity.

Wildlife manager — a person who manages wildlife habitat, and/or other related human activities.

Wildlife sanctuaries — locations set aside for plants and animals wherein human activity is curtailed or prohibited, thereby respecting and protecting the breeding, feeding, or resting of the species.

Whole language — a broad term which demonstrates how reading, writing, languages, and spelling integrates with a specific theme to achieve individual learner skills and mastery.

Zero population growth — the maintenance or holding of population numbers at a fixed level.